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Abundance and Run Timing of Adult Pacific Salmon in the East Fork Andreafsky River, Yukon Delta National Wildlife Refuge, Alaska, 2001 and 2002

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Abstract

A resistance board weir was used to collect abundance, run timing, and biological data from salmon returning to the East Fork Andreafsky River, a tributary to the lower Yukon River, between July 15 and September 15 2001, and between June 19 and September 14, 2002. This monitoring project was initiated in 1994, and has annually provided reliable data necessary for managing refuge fishery resources that contribute to major Yukon River commercial and subsistence fisheries.

A total of 2,086 chum *Oncorhynchus keta*, 1,148 chinook *O. tshawytscha*, 820 pink *O. gorbuscha*, 15 sockeye *O. nerka*, and 9,252 coho *O. kisutch* salmon were counted through the weir during 2001. A total of 44,194 chum, 4,123 chinook, 165,990 pink, 43 sockeye, and 3,534 coho salmon were counted through the weir during 2002.

The 2001 escapement of 2,086 chum salmon and 1,148 chinook salmon were only a portion of the total run size. Estimated total escapement was 9,758 chum salmon and 3,404 chinook salmon. Run timing for chum and chinook salmon during 2001 cannot be determined due to insufficient data. The 2002 escapement of 44,194 chum salmon and 4,123 chinook salmon monitored the entire run size. Run timing for chum and chinook salmon during 2002 was early compared to the 1994-2000 average.

Three age groups were identified from 101 sampled chum salmon during 2001, and five age groups were identified from 774 chum salmon during 2002. Four age groups were identified from 124 chinook salmon during 2001, and 436 chinook salmon during 2002. Three age groups were identified from coho salmon during 2001 and 2002. Sample sizes in 2001 and 2002 were 294 and 258 coho salmon, respectively.

Other species counted through the weir during 2001 include 13 Dolly Varden *Salvelinus malma*, 4,581 whitefish *Coregonus pidschian* and *Coregonus nasus*, and two Arctic grayling *Thymallus arcticus*. The other species counted through the weir in 2002 included two Dolly Varden, 3,586 whitefish, twelve northern pike *Esox lucius*, and eleven Arctic grayling.

Introduction

The Andreafsky River is one of several lower Yukon River tributaries on the Yukon Delta National Wildlife Refuge (Refuge). The main stem Andreafsky River and its primary tributary, the East Fork, provide important spawning and rearing habitat for chum *Oncorhynchus keta*, chinook *O. tshawytscha*, pink *O. gorbuscha*, sockeye *O. nerka*, and coho *O. kisutch* salmon (USFWS 1991). The Andreafsky River drainage supports the largest return of pink salmon in the Yukon River drainage and typically ranks second to the Anvik River in summer chum salmon escapement (for management purposes, summer chum are those enumerated prior to August 1). The Andreafsky River (both forks) also supports one of the largest returns of chinook salmon in the Yukon River drainage. Combined escapement for both forks exceeds the Salcha and Chena Rivers objectives (Bergstrom et al. 2001). These Andreafsky River stocks contribute to a large subsistence fishery and pass through two commercial fishery districts between the Yukon and Andreafsky River mouths.

The Alaska National Interest Lands Conservation Act (ANILCA) mandates that salmon populations and their habitats be conserved within the Refuge, international treaty obligations be fulfilled, and subsistence opportunities for local residents be maintained. Salmon escapement studies for lower Yukon River tributaries on the Refuge and the endeavor to fulfill obligations included in the U.S./Canada Yukon River Treaty are ranked as priorities in the Refuge Fishery Management Plan (USFWS 1991). Compliance with ANILCA mandates cannot be ensured without reliable data on Refuge originating stocks.

Adequate escapements to individual tributaries and main stem spawning areas are required to maintain genetic diversity and sustainable harvests, but management is complicated by the mixed stock nature of the Yukon River fishery. Managers attempt to distribute catch over time to avoid over-harvesting individual stocks as each may have distinct migratory timing (Mundy 1982). Stocks or species returning in low numbers or early and late portions of runs may be incidentally over-harvested during intensive harvesting of abundant stocks. Data on escapements, which is necessary for effective management, is lacking for many individual stocks in the Yukon drainage.

In compliance with ANILCA mandates, the U.S. Fish and Wildlife Service (Service) has operated a weir on the East Fork of the Andreafsky River since 1994. Specific objectives of the project are to: (1) enumerate adult salmon; (2) describe run timing of chum, chinook, pink, and coho salmon returns; (3) estimate the age, sex, and length composition of adult chum and chinook salmon populations; and (4) identify and count other fish species passing through the weir. Since 1995, weir operation has been extended into September to collect abundance, run timing, and age, sex, and length composition data from returning coho salmon. Results from the 2001 and 2002 weir operations are presented in this report.

Study Area

The Andreafsky River is located in the lower Yukon River drainage in western Alaska (Figure 1). The regional climate is subarctic with extreme temperatures reaching 28 and – 42˚C at St. Mary's, Alaska (Leslie 1989). Mean July high and February low temperatures between 1976 and 1983 were 17 and –18˚C. Average yearly precipitation was approximately 48 cm of rain and 189 cm of snow. River ice breakup typically occurs in May or early June, and the river usually begins to freeze in late October (USFWS 1991). Maximum discharge is most often reached following breakup, and sporadic high discharge periods are generated by heavy rains that are prevalent between late July and early September.

Draining a watershed of 5,450 km^2, the Andreafsky River is one of the three largest Yukon River tributaries within Refuge boundaries (USFWS 1991). The main stem and its largest tributary, the East Fork, parallel each other in a southwesterly direction for more than 200 river-kilometers (rkm) before converging. The main stem continues for another 7 rkm before discharging into the Yukon River approximately 160 rkm from the Bering Sea. Flowing through the Andreafsky Wilderness for most of their length, the East Fork and Andreafsky River main stem are designed as wild rivers in the National Wild and Scenic River System.

The East Fork originates in the Nulato Hills at approximately 700 m elevation and drains an area of about 1,950 km^2. The river cuts through alpine tundra at an average gradient of 7.6 m per km for 48 rkm. It then flows through a forested river valley bordered by hills that rarely exceed 400 m elevation. Willow, spruce, alder, and birch dominate the riparian zone and much of the hillsides. Dropping at an average rate of 1.4 m per km, this 130 rkm long section is characterized by glides and riffles flowing over gravel and rubble substrate. The East Fork widens in the lowermost 38 rkm and meanders through a wet lowland valley interspersed with forest and tundra and bordered by hills that are typically less than 230 m elevation. A gradient of 0.14 m per km and smaller substrate particles allow an abundance of aquatic vegetation to grow in the lower stream channel. Water fluctuations in the Yukon River also affect the stage height in this section of the East Fork.

Methods

Weir Operation

A resistance board weir (Tobin 1994; Tobin and Harper 1995) spanning 105 m was installed in the East Fork (62E07'N, 162E48'W) approximately 43 rkm upstream from the Yukon River and 26 air-km NE from St. Marys, Alaska (Figure 1). This location is approximately 2.4 rkm downstream from the 1994 weir site described by Tobin and Harper (1995) and 2.1 rkm downstream from the sonar and counting tower site described by Sandone (1989). The weir was moved downstream to this wider section of river in June 1995 to enhance its performance during high water conditions, which are common in late summer.

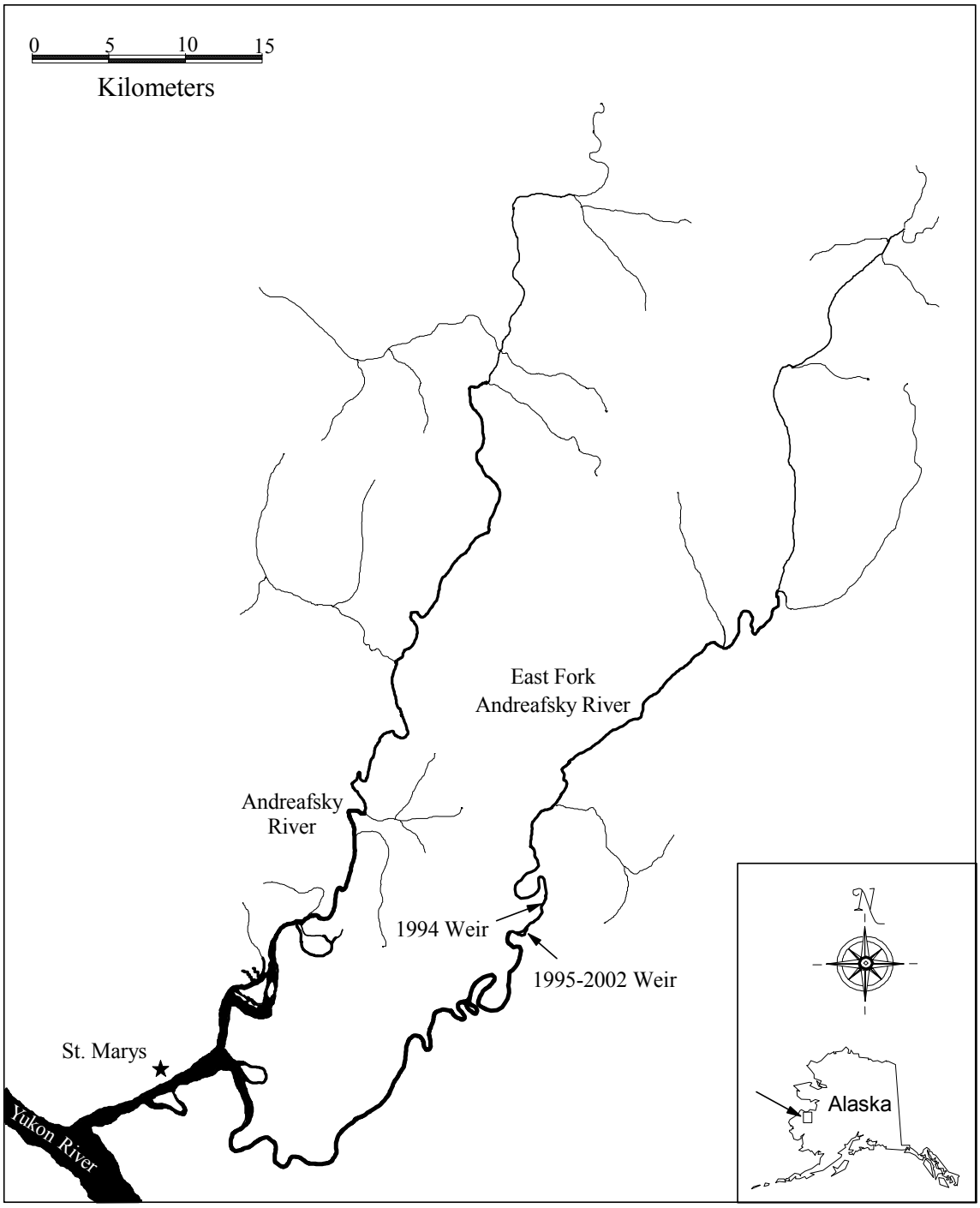

Figure 1.—Weir locations in the East Fork Andreafsky River, Alaska, 1994-2002.

A new resistance board weir was constructed during the winter of 2001; implementing slightly modified design changes from the previous weir utilized between 1994 and 2000 (Tobin 1994). Design changes consisted of: 1) narrowing panel width to 1.02 meters; 2) removing connector yokes by extending each stringer; 3) adding an additional stringer at the aft of the panel to restrict noise and limit the number of broken pickets; 4) replacing resistant boards with .08 centimeter (1/32 inch) aluminum sheeting on two sides of Styrofoam blue board; 5) replacing the wooden stringers that the resistance boards were hinged to with 2.54 cm (1 inch) square aluminum tubing; 6) replacing the downstream wooden stringer which is attached to the cable and chain assembly with 2.54 cm (1 inch) square aluminum tubing; 7) re-routing the cable and chain assembly to allow one person to set the resistance board; and 8) outfitting the boat passage panels with .64 cm (1/4 inch) high density black plastic on the end posterior to the substrate rail. The new resistance board weir was installed and operated during 2001 and 2002.

A staff gauge was installed upstream of the weir to measure daily water levels. Staff gauge measurements were calibrated to correspond with the average water depth across the river channel at the upstream edge of the weir. Water temperatures were generally collected once daily between 0800 and 0900 h.

Two passage chutes were installed, one on river right and one on river left. A fish trap was installed on the river right passage chute to facilitate efficient fish passage and sampling during various river stage heights. All fish were enumerated to species as they passed through the live trap or fish passage chute (Tobin and Harper 1995). Salmon and resident fish that did not pass through these areas, but escaped upstream through gaps between pickets were not counted. Picket spacing was variable (3.5 and 4.8 cm), because new and recycled weir panels were used. Panels with wider picket intervals were designed to remain functional during higher flows and allow independent passage of smaller pink salmon and resident fish species between pickets. Fish were passed and counted intermittently between 0001 h and midnight each day. The duration of each counting session varied depending on the intensity of fish passage through the weir and was recorded to the nearest 0.25 h at each counting station.

The weir integrity was inspected for holes using snorkel gear and cleaned daily. Cleaning consisted of raking debris from the upstream surface of the weir or walking across each panel until it was partially submerged allowing the current to wash accumulations downstream.

Biological Data

Sample weeks or strata began on a Sunday and ended the following Saturday. Sampling generally commenced near the beginning of the week, and an effort was made to obtain a weekly quota of 160 chum, 140 chinook, and 140 coho salmon in as short a period (1-3 days) as possible to approximate a pulse or snapshot sample (Geiger et al. 1990). All target species within the trap were sampled to prevent bias.

Fish sampling consisted of measuring length, determining sex, collecting scales and then releasing the fish upstream of the weir. Length was measured from mid-eye to fork-of-caudal-fin and rounded to the nearest 5 mm. Sex was determined by observing external characteristics. Scales were removed from the preferred area for age determination (Koo 1962; Mosher 1968). One scale was collected from each chum salmon, and four scales were collected from each chinook and coho salmon. Scale impressions were made on cellulose acetate cards using a heated scale press and examined with a microfiche reader. Age was determined by an Alaska Department of Fish and Game biologist and reported according to the European Method (Koo 1962).

Age and sex composition for the weekly escapement was expanded directly from the age and sex composition in the weekly sample using a stratified sampling design (Cochran 1977). A two-tailed *t* test (α =.05) was used to compare mean lengths of same aged males and females (Zar 1984). Chi-square contingency table analysis was used to test for differences in age composition between the sexes when applicable. Adjustments were made to the test following Rao and Thomas (1989), since the standard test applies to data collected using a simple random sample design and not a stratified sampling design. The X^2 statistic, hereafter referred to as X^2 (δ), was divided by the mean generalized design effect, δ, as a first order correction to the standard test (Rao and Thomas 1989). Estimated design effects for the cells and marginals are presented in the results. Age and sex specific escapements in a stratum, A_{hij}, and their variances, $V[A_{hij}]$, were estimated as:

$$A_{hij}, = N_h \, P_{hij} \, ;$$

and

$$V[A_{hij}] = \mathrm{N_h}^2 \left(1\text{-}n_h/N_h\right)\left(P_{hij}(1\text{-} P_{hij})/n_h\text{-}1\right)$$

where

N_h = total escapement of a given species during stratum *h*
P_{hij} = estimated proportion of age *i* and sex *j* fish, of a given species, in the stratum *h*; and
n_h = total number of fish, of a given species, in the sample for stratum *h.*

Abundance estimates and their variances for each stratum were summed to obtain age- and sex-specific escapements for the season as follows:

$$Aij = \sum A_{hij} \, ;$$

and

$$\mathrm{V}[Aij] = \sum V(A_{hij}) \, ;$$

where

Aij = estimated total escapement for age *i* and sex *j* fish of a given species.

Estimates of missed salmon passage for 2001

Days with no counts were reported as zero counts. Estimates were calculated for these dates and were based on the average daily proportion of passage collected from 1994-2000. An average of the daily proportions for previous years data is calculated since daily escapement can vary between years. The sum of the averaged daily proportions, calculated for days with zero counts, is the estimated total escapement missed. The total escapement is the sum of the observed counts during 2001 divided by one minus the proportion missed in 2001. Years with time periods that were not monitored between 1994 and 2000, were not used in averaging proportions.

Results

Weir Operation 2001

Due to high waters, the East Fork Andreafsky River project in 2001 was delayed from a typical start date of June 15-20 until July 15. Chum and chinook salmon were past the peak of their spawning migration when enumeration began. Comparing the escapement counts from previous years indicate that significant proportions of chum and chinook migrations passed prior to weir installation.

The weir was functional during most of the operational period. A moderate stage height averaging 74 cm persisted through most of the operational period of the weir with minimum and maximum levels reaching 34 and 152 cm (Appendix 1). A high water event caused the weir to submerge from September 2-9. Turbid water prevented accurate counts during this time period. Water temperatures averaged 10°C from June 26 to September 16 (Appendix 1). Minimum and maximum temperatures reached 7 and 14°C.

Biological Data 2001

Five species of Pacific salmon, including 2,086 chum, 1,148 chinook, 820 pink, 15 sockeye, and 9,252 coho salmon, were counted upstream through the weir (Appendix 2). Other species counted through the weir include 13 Dolly Varden *Salvelinus malma*, 4,581 whitefish *Coregonus pidschian* and *C. nasus*, and two Arctic grayling *Thymallus arcticus* (Appendix 2).

Chum Salmon.—Chum salmon (*N*= 2,086) passed through the weir from July 15 to September 15. However the escapement is considered a partial count due to the late installation. An estimated 7,673 chum salmon passed the weir site prior to installation, for a total estimated passage of 9,758 chum salmon (Appendix 3). Peak passage normally occurs the week of July 3-11 for chum salmon, however due to a late installation date, the peak passage was not monitored (Figure 2). Gillnet marks (*N*=16) were observed on < 1% of the chum salmon passing the weir (Appendix 2).

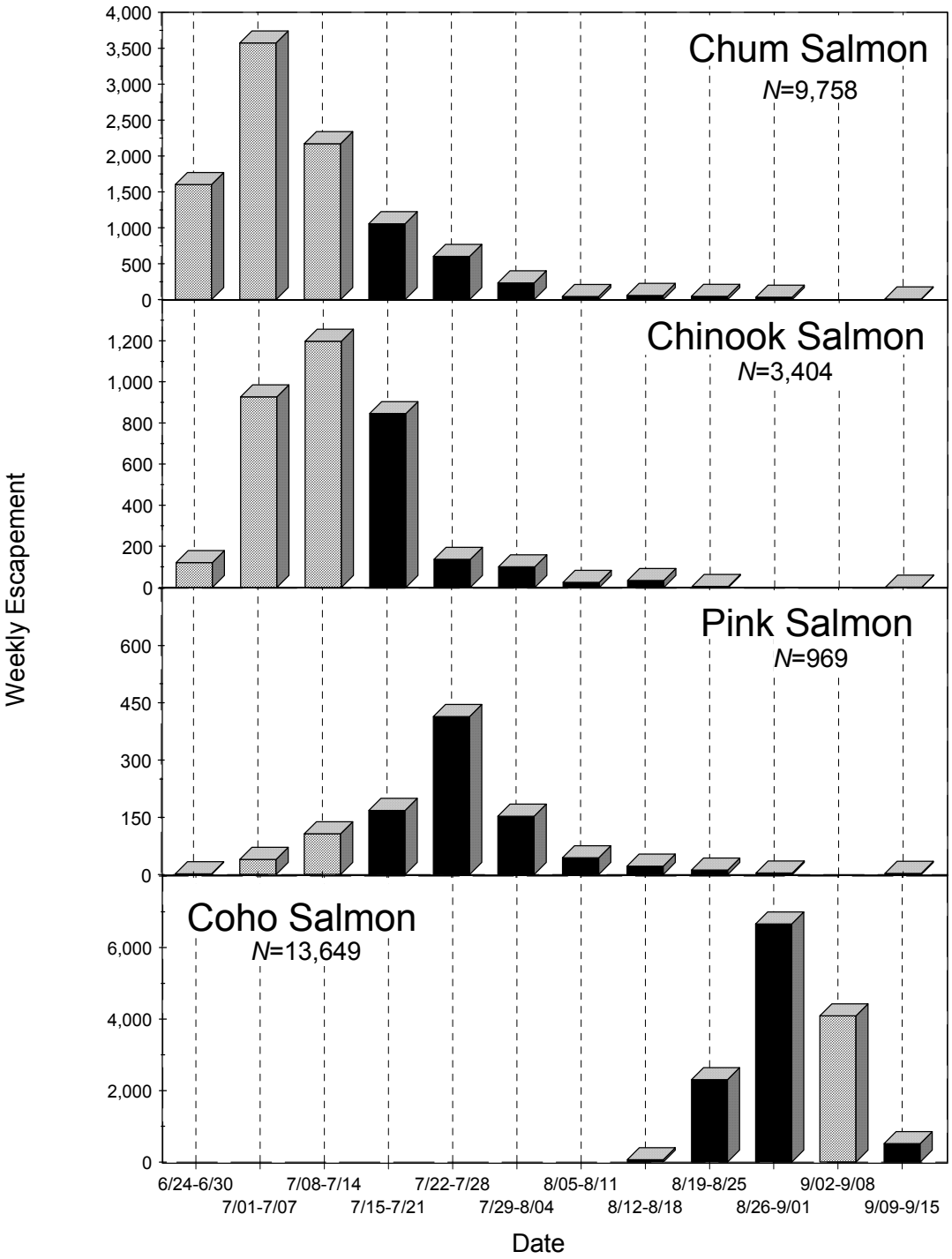

Figure 2.—Weekly chum, chinook, pink, and coho salmon escapements through the East Fork Andreafsky River weir, Alaska, 2001. Escapements with ten shaded areas are estimated using historical information.

Three age groups were identified from 101 chum salmon sampled between July 16 and August 30 (Appendix 5). Females composed an estimated 54% of the sampled escapement (Figure 3; Appendix 5). The sampled escapement was composed primarily of age 0.4 (84%) and 0.3 (15%) chum salmon.

Age composition differed between sexes ($X^2(\delta.)=6.55$, df=2, P<0.001). In sampled fish, the mean length of males was greater than that of same-aged females for fish age 0.3 (two-tailed *t* test: age 0.3, t=5.4, df=78, P<0.001). There was no significant difference (P=0.057) in the mean lengths of age 0.4 males and same-aged females. (Appendix 6)

Chinook Salmon.—Chinook salmon (*N*=1,148) passed through the weir from July 15 to September 15. However the escapement is considered a partial count due to the late installation. An estimated 2,256 chinook salmon passed the weir site prior to installation, for a total estimated passage of 3,404 chinook salmon (Appendix 3). Peak passage normally occurs the week of July 3-11 for chinook salmon, however due to a late installation date, the peak passage was not monitored (Figure 2). Gillnet marks (*N*=20) were observed on 2% of the chinook salmon passing the weir (Appendix 2).

Four age groups were identified from 124 chinook salmon sampled from the weir between July 16 and September 15 (Appendix 7). Females composed an estimated 61% of this escapement, and predominated every week (Figure 3; Appendix 7). Age 1.4 chinook salmon were most abundant (62%) followed by age 1.3 (18%) and age 1.2 (17%) fish.

Age composition differed between sexes ($X^2(\delta.)=48.9$, df=3, P=0.000). Males were predominantly age 1.2 (44%) followed by age 1.3 (30%), and females were primarily age 1.4 (87%). In sampled fish, the mean length of age 1.3 females was greater than that of same-aged males (two-tailed *t* test: age 1.3, t=5.8, df=21, P=0.000; age 1.4, t=4.4, df=78, P=0.000) (Appendix 8)

Pink Salmon.—Although some were able to pass uncounted between panel pickets, 820 pink salmon passed through the weir at counting stations from July 15 to September 15. However the escapement is considered a partial count due to the late installation. An estimated 149 pink salmon passed the weir site prior to installation, for a total estimated passage of 969 pink salmon (Appendix 9). Peak passage occurred the week of July 22-28 (Figure 2).

Sockeye Salmon.—Sockeye salmon (*N*=15) passed through the weir from July 18 to August 30. Peak passage occurred the week of July 22-28 (Appendix 2).

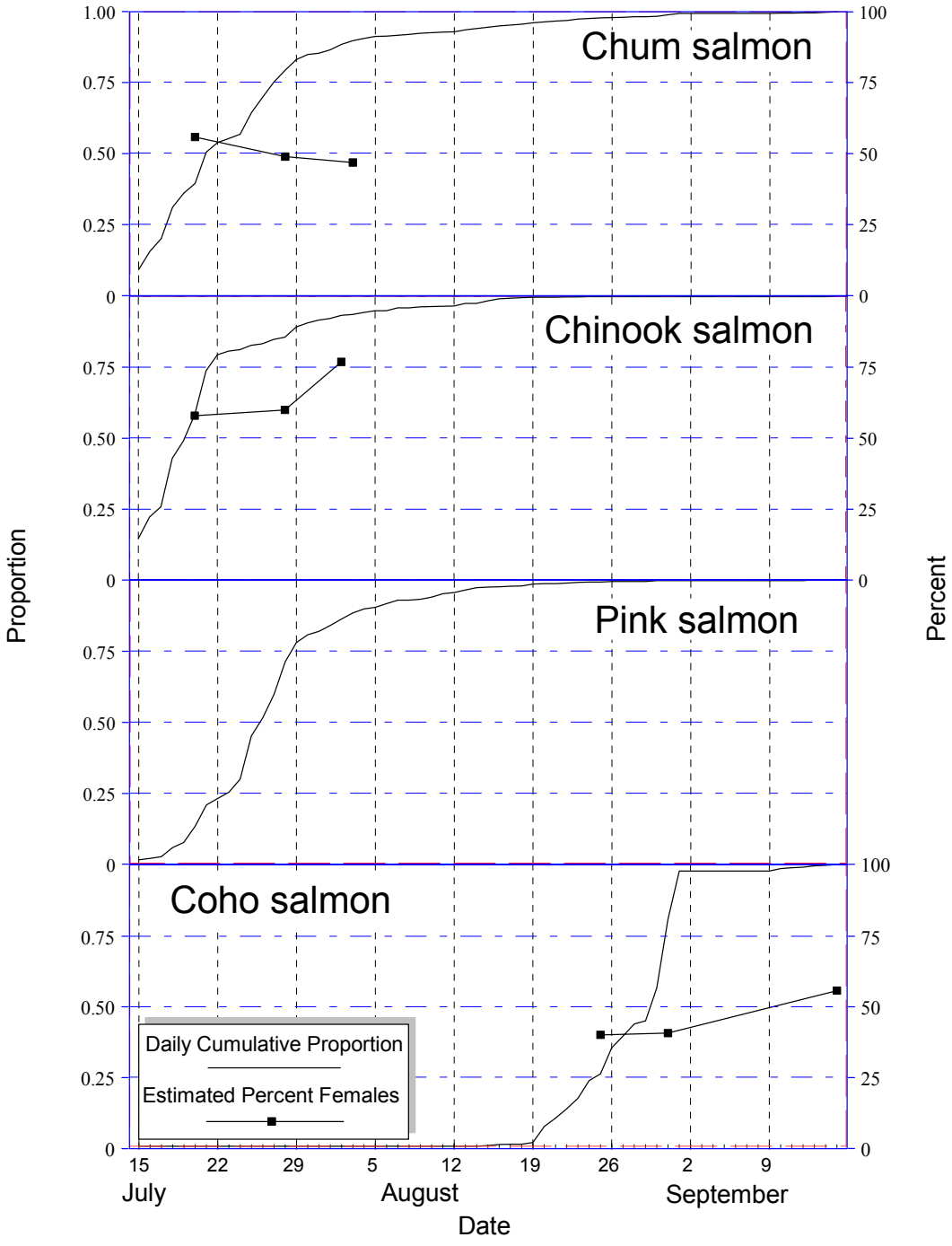

Figure 3.—Cumulative proportion and sex composition of chum, chinook, pink, and coho salmon escapement through the East Fork Andreafsky River weir, Alaska, 2001. Cumulative proportions are based upon weir operation time and not estimates.

Coho Salmon.—Coho salmon (N=9,252) passed through the weir from August 14 to September 15. Counts of salmon were made each day except the period of September 2 through 9, when the weir was submerged, and passage was estimated. Coho salmon were still passing the weir at the daily rate of 1,576 fish on September 1, the last day before the weir was submerged. An estimated 4,397 coho salmon passed during the flooded time period (Appendix 9). Peak passage (N=6,663) occurred the week of August 26 to September 1 (Figure 2; Appendix 2), and the median passage date was August 31. Gillnet marks (N=20) were observed on < 1% of the coho salmon passing the weir (Appendix 2).

Three age groups were identified from 294 coho salmon sampled between August 21 and September 15 (Appendix 10). During this period, 9,186 coho salmon were counted through the weir. Females composed an estimated 40% of this escapement (Figure 3; Appendix 10). Age 2.1 coho salmon were most abundant (95%). For age 1.1 and 2.1 fish, there was no significant difference (P>0.05) in the mean lengths of males and same-aged females (Appendix 11).

Weir Operation 2002

The weir was functional during the entire operational period. Abnormally low stage heights averaging 10 cm persisted through most of the operational period of the weir with minimum and maximum levels reaching –1.22 and 52 cm (Appendix 12). Water flow measurements were taken several times during operations and ranged from 675 to 191 ft^3/sec. The lowest measurement was taken August 30, 2002, during which time approximately 80% of the weir was out of the water. Water temperatures averaged 13°C from June 18 to September 16 (Appendix 12). Minimum and maximum temperatures were 9 and 18°C.

Biological Data 2002

Five species of Pacific salmon, including 44,194 chum, 4,123 chinook, 165,990 pink, 43 sockeye, and 3,534 coho salmon, were counted upstream through the weir (Appendix 13). Other species counted through the weir include two Dolly Varden, 3,586 whitefish, twelve northern pike, and eleven Arctic grayling.

Chum Salmon.—Chum salmon (*N*=44,194) passed through the weir from June 21 to September 14. Peak passage (*N*=14,795) occurred the week of June 30 to July 6 (Figure 4; Appendix 13), and the median passage date was July 3 (Appendix 14). Counts did not exceed 100 fish per day after July 31. Gillnet marks (*N*=269) were observed on < 1% of the chum salmon passing the weir (Appendix 13).

Five age groups were identified from 774 chum salmon between June 28 and July 30 (Appendix 15). During this period, 44,055 chum salmon were counted through the weir. Females composed an estimated 51% of this escapement, and were predominant between June 16-22, and July 7-30 (Figure 5; Appendix 15). The sampled escapement was composed primarily of age 0.3 (82%), age 0.4 (14%), and age 0.5 (4%) chum salmon. Age 0.2 and 0.6 represented < 1% of the escapement.

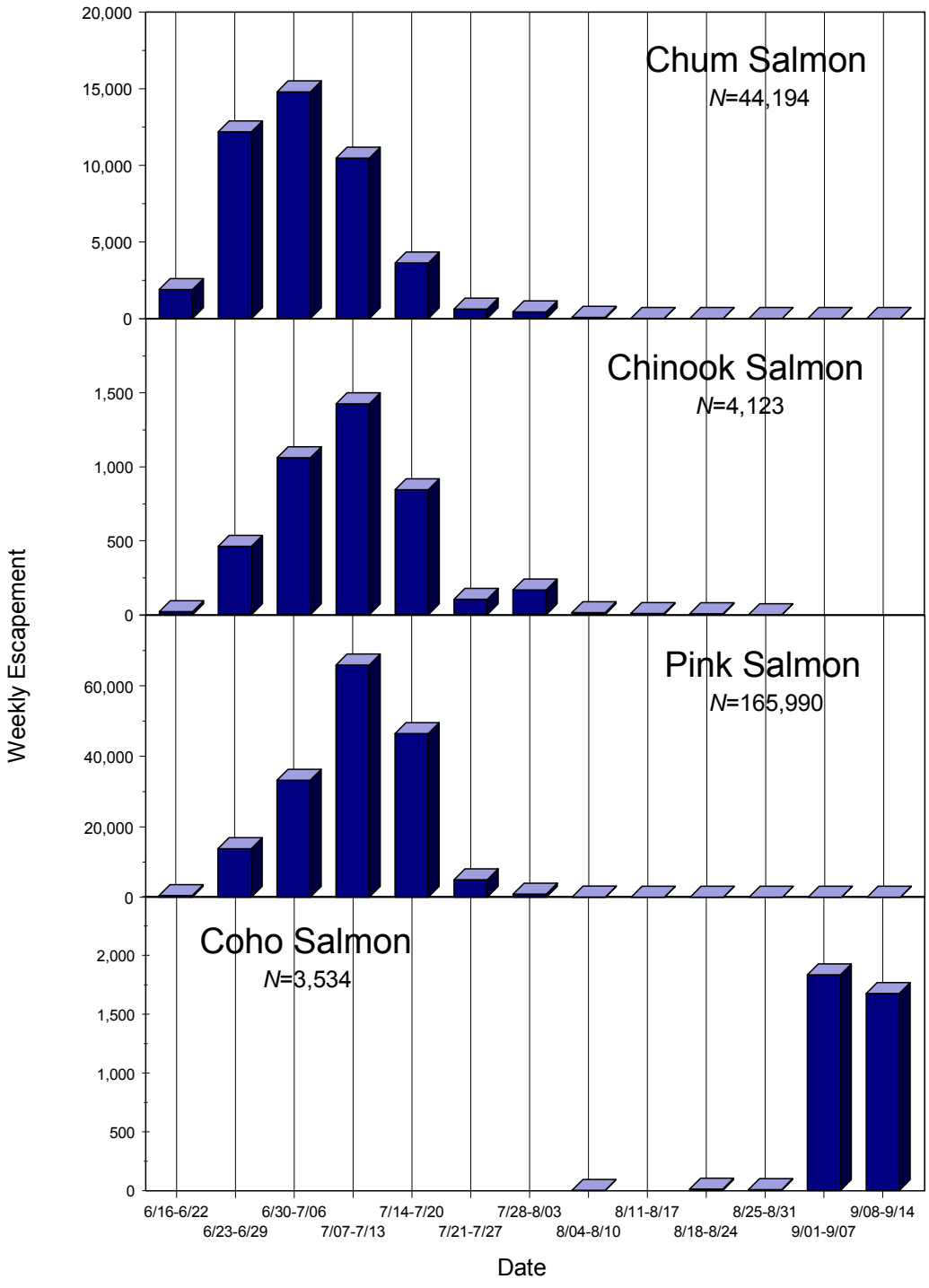

Figure 4.—Chum, chinook, pink, and coho salmon escapement through the East Fork Andreafsky River weir, Alaska, 2002.

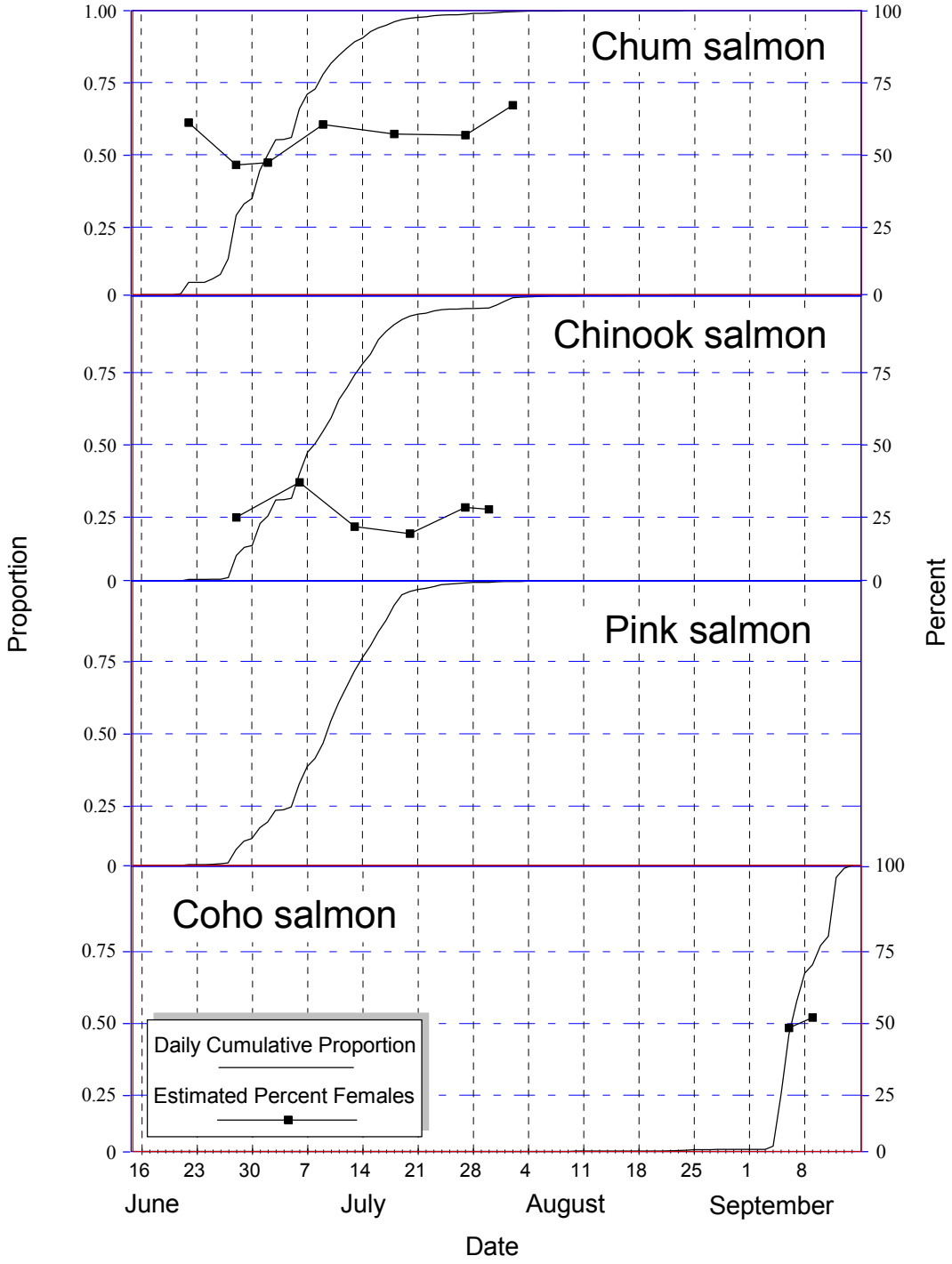

Figure 5.—Cumulative daily proportion and sex composition of chum, chinook, pink, and coho salmon escapement through the East Fork Andreafsky River weir, Alaska, 2002.

There was no significant difference in age composition between sexes (X^2(δ.)=6.0, df=4, P=0.199). In sampled fish, the mean length of males was greater than that of same-aged females for fish age 0.3 and greater (two-tailed *t* test: age 0.3, t=15.5, df=643, P<0.001; age 0.4, t=5.1, df=93, P<0.001; age 0.5, t=5.5, df=21, P<0.001; insufficient data for age group 0.6). For age 0.2 fish, there was no significant difference in the mean lengths of males and same-aged females (two-tailed *t* test: age 0.2, t=2.3, df=5, P=0.072) (Appendix 16).

Chinook Salmon.—Chinook salmon (*N*=4,123) passed through the weir from June 21 to August 30. Peak passage (*N*=1,427) occurred the week of July 7-13 (Figure 4; Appendix 13), and the median passage date was July 9 (Appendix 14). Counts did not exceed 30 fish per day after August 2. Gillnet marks (*N*=38) were observed on < 1% of the chinook salmon passing the weir (Appendix 13).

Four age groups were identified from 436 chinook salmon sampled between June 28 and July 30 (Appendix 17). During this period, 4,092 chinook salmon were counted through the weir. Males composed an estimated 77% of this escapement and predominated every week (Figure 5; Appendix 17). Age 1.3 chinook salmon were most abundant (44%) followed by age 1.2 (31%), and age 1.4 (24%) fish.

Age composition differed between sexes (X^2(δ.)=55.5, df=3, P<0.001). Males were predominantly age 1.3 (48%) followed by age 1.2 (39%) and age 1.4 (12%), and females were predominantly age 1.4 (64%) and age 1.3 (29%). In sampled fish, the mean length of age 1.4 females was greater than that of same-aged males (two-tailed *t* test: age 1.4, t= 3.7, df=85, P<0.001)(Appendix 18). There was no significant difference (P=0.064) in the mean lengths of age 1.3 males and same-aged females. There was insufficient data for age group 1.2 and 1.5 chinook salmon.

Pink Salmon.—Although some were able to pass uncounted between panel pickets, 165,990 pink salmon passed through the weir at counting stations from June 21 to September 12. Peak passage (*N*=65,922) occurred the week of July 7-13 (Figure 4; Appendix 13), and the median passage date was July 10 (Appendix 14).

Sockeye Salmon.—Sockeye salmon (*N*=43) passed through the weir from July 6 to September 9. Peak passage (*N*=12) occurred the week of July 28 to August 3 (Appendix 13).

Coho Salmon.—Coho salmon (*N*=3,534) passed through the weir from August 4 to September 14. Peak passage (*N*=1,834) occurred the week of September 1-7 (Figure 4; Appendix 13), and the median passage date was September 7. Gillnet marks were not observed on any coho salmon passing the weir.

Three age groups were identified from 258 coho salmon sampled between September 5 and 9 (Appendix 19). During this period, 3,510 coho salmon were counted through the weir. Females composed an estimated 45% of this escapement (Figure 5; Appendix 19).

Age 2.1 coho salmon were most abundant (84%) followed by age 3.1 (16%) fish. There was no significant difference ($P>0.05$) in the mean lengths of males and same-aged females (Appendix 20).

Discussion

Weir Operations

During 2001 an unknown number of salmon passed prior to weir installation; however, the historical information dating back to 1994 indicates a large portion of chum and chinook were missed before the weir was installed. Estimates were constructed based on historical information for chum, chinook, and pink salmon escapements.

The 2001 weir operations were also interrupted during a flooding event occurring from September 2 to 9. Although no fish were observed escaping over panels that were submerged during the high water event, it is assumed a number of coho salmon probably passed undetected.

Operations during 2002 were affected by extreme low water conditions, which prevailed through most of the operational period. The average stage height of 10 cm is the lowest level recorded since 1994. During these extreme low water periods fish were observed holding below the weir site, therefore panels were removed to facilitate efficient fish passage.

Picket spacing allowed pink salmon and smaller resident fish to pass upstream yet effectively blocked passage of other salmon species. Consequently, pink salmon, Dolly Varden, whitefish, and northern pike counts are conservative.

Biological Data

Chum Salmon.—Chum salmon escapement to the East Fork during 2001 (N=2,086) was only a partial count due to a late installation. Based on historical data, the chum salmon run reconstruction estimates for 2001 were 9,758, the lowest chum salmon escapement recorded since 1994. Chum salmon run timing in 2002 was the earliest on record since 1994, the median passage date at the weir was July 3, three days before the 1994-2000 average (Tobin and Harper 1995; 1996; 1997; 1998). Chum salmon escapement to the East Fork during 2002 (N=44,194) was poor relative to the 1994-1998 escapements which ranged from 51,139 to 200,918 fish, and greater than the 1999-2001 escapements (Figure 6; Appendix 21). Chum salmon escapements ranged from 22,918 to 200,981 fish between 1994 and 2000 with 2000 the poorest on record through that date.

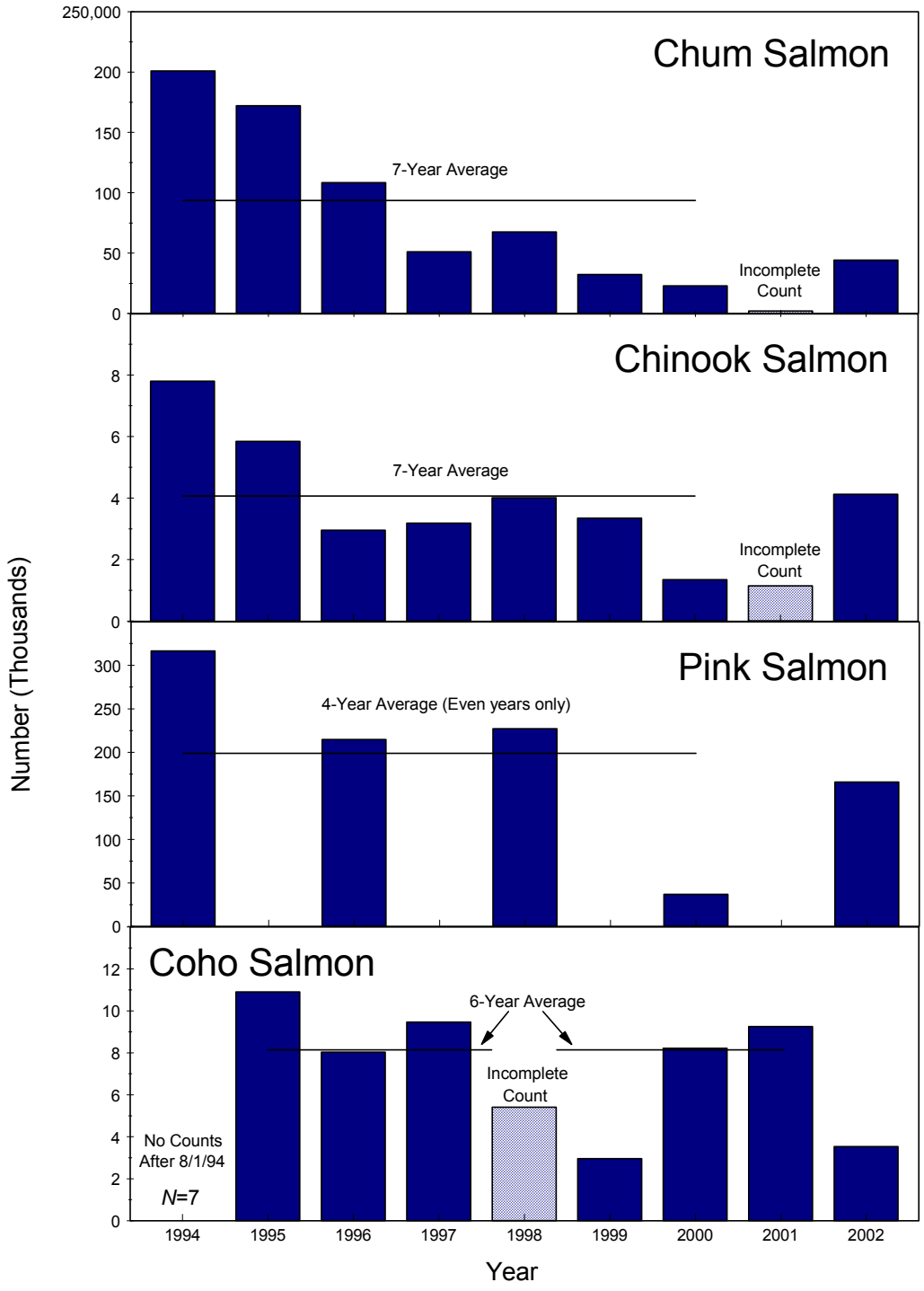

Figure 6.—Chum, chinook, pink, and coho salmon escapements through the East Fork Andreafsky River weir, Alaska, 2002.

The escapement in 2001 (*N*=9,758) was 90% below the 1994-2000 average (*N*=93,636); whereas the escapement in 2002 (*N*=44,194) was only 53% below. The 2002 escapement was a substantial improvement over all years since 1998.

The escapement data indicate summer chum salmon returns to the Yukon River drainage were well below average during 2001. Because of low returns of chum salmon in recent years, minimal commercial harvests have occurred since 1997 (Vania, et.al., 2000) and there was no commercial harvest of chum salmon in 2001. Preliminary escapement and commercial harvest data from 2002 indicate summer chum salmon returns to the Yukon River drainage were below average (unpublished data, Alaska Department of Fish and Game). Summer chum commercial harvest during 2002 was restricted to two periods in district 6, and incidental harvest taken during the directed chinook salmon commercial fishery.

Poor escapement during 2001 and 2002 may be linked to changes in the marine ecosystem, which adversely affected salmon growth and survival during 1997 and 1998 (Kruse 1998). Parent year escapements for the 2001 and 2002 returns were primarily 1996 (*N*=108,450), an average year; and 1997 (*N*=51,139) and 1998 (*N*=67,591), both below average years (Figure 6; Appendix 21). Age composition data for 2001 indicates that the below average parent year of 1997 produced a below average number of 0.3 age spawners. Previous returns (1994–2000) indicate that the percent of age 0.3 fish generally increases as the run progresses (Tobin and Harper 1996; 1997; 1998). If this is the case, the composition of 15% age 0.3 fish may actually be over represented, possibly indicating that very few fish were produced from the 1997 brood year. However, the 2001 age composition data is suspect, because of insufficient samples collected during the peak of the run. Age composition data for 2002 indicates that an average number of age 0.3 (82%) spawners were produced by the 1998 parent year. The 2002 chinook salmon escapement also returned with the uncommon age group 0.6 (0.6%). This is the first year age group 0.6 has been present in the East Fork age composition data.

Chinook Salmon.—Chinook salmon escapement to the East Fork during 2001 (*N*=1,148) was only a partial count because of a late installation. Based on historical data, the estimated 2001 chinook salmon escapement (*N*=3,404) is 16% below the 1994-2000 average (*N*=4,069). Chinook salmon escapements ranged from 1,344 to 7,801 fish between 1994 and 2000 (Figure 6; Appendix 21). Chinook salmon run timing in 2002 was early compared to the 1994-2000 average, the median passage date at the weir was July 9, two days before the 1994-2000 average (Tobin and Harper 1995; 1996; 1997; 1998). Chinook salmon escapement to the East Fork during 2002 (*N*=4,123) was within a hundred fish of the 1994-2000 average.

Aerial surveys conducted by the Department during 2001, and 2002 estimated chinook salmon escapements of 1,065 for 2001, and 1,447 for 2002 (Appendix 21). Both estimates were below the aerial index escapement goal of 1,500 chinook salmon, however the 2002 estimate was 96% of the aerial index objective.

The proportion of females in the 2002 escapement (23%) is low compared to previous weir escapements (range 25-51%). This is likely a result of a weak parent year escapement for age 1.4 fish (1996; *N*=2,955); the predominant age among females, and disproportionately large parent year escapements for other age groups. The proportion of females in the 2001 weir escapement (60%) was high compared to previous weir escapements. This is like a result of the limited sample taken during the season due to high waters, which prevented a typical installation.

There was no commercial harvest for chinook salmon during 2001. The chinook salmon commercial season was restricted, and harvest during 2002 was 75% below the 1990-1999 average harvest of 97,000 fish.

Pink Salmon.—Pink salmon have strong returns to the East Fork Andreafsky River. Escapement to the East Fork during 2001 (*N*=820) was only a partial count. However based on historical data, the estimates for pink salmon (*N*=969) escapement during 2001 remain above 1997 and 1999 escapements (*N*=429 and 751, respectively), and below the 1995 pink salmon escapement (*N*=1,972). Pink salmon escapement during 2002 (*N*=165,990) was 83% of the 1994-2000 average. However, there was a larger return of pink salmon compared to year 2000 (*N*=37,069). The 2002 pink salmon escapement is 92% of the three-year average.

Due to the nature of pink salmon run timing during odd year returns, no conclusions can be determined for run timing during 2001. During 2002 pink salmon run timing was early compared to previous years. The median passage date was July 10, five days earlier than the four-year average.

Picket interval spacing on half of the weir panels from 1994 to 2000 was designed to allow independent passage of smaller pink salmon and remain functional during higher flows. In 2001 90% of the weir panels were replaced and picket spacing was equal to the largest spacing found in older panels used prior to 2001 operations. Therefore pink salmon counts are still a measure of relative abundance in all years of operation with a possibility of a larger number passing through the panels after 2000.

Sockeye Salmon.—Large populations of sockeye salmon are absent in the Yukon River drainage (Bergstrom et al. 1995). Information on spawning locations in the East Fork Andreafsky has not been collected. The East Fork escapement has not exceeded 248 sockeye salmon between 1994 and 2002. Sockeye salmon escapement to the East Fork during 2001 (*N*=15) was only a partial count. No attempt has been made to estimate days missed. Sockeye salmon escapement during 2002 (*N*=43) was the lowest observed escapement returning to the East Fork. Due to the small magnitude of sockeye salmon escapements through the weir, the run magnitude and timing results are potentially unreliable, but are a measure of a very small population.

Coho Salmon.—A high water event caused portions of the weir to flood during September 2-9, 2001, and eight panels remained submerged 4-6" through September 10. However, partial counts were collected on September 10. No fish were observed passing

over the weir during the day of partial counting. The estimate of 4,397 coho salmon passing during this flooded period is based on historical data dating back to 1995. However, the variable nature of coho salmon run timing influenced by water level fluctuations indicate these estimates are subject to suspicion. Coho salmon run timing during 2001 was average compared to previous years. The median passage date was also within one day of the average. The coho salmon run timing during 2002 was extremely late. The median passage date, September 7, was seven days behind the average. This is likely a result of the extreme low waters experienced during the typical peak timing for coho salmon. As a result, it is possible a substantial number of spawners may have held in lower parts of the river, and therefore remained uncounted. Crew members did observe coho salmon in lower portions of the East Fork after the weir was removed. Therefore, the 2002 weir escapement (*N*=3,534) is considered to be a conservative estimate of the actual escapement.

Coho salmon escapements ranged from 2,963 to 10,901 fish between 1995 and 2001 (Figure 6; Appendix 21). Coho salmon escapement during 2002 (*N*=3,534) was 43% of the 1995-2001 average, excluding 1998. Coho salmon escapement during 2001 (*N*=9,252) was above average compared to previous years.

Recommendations

The East Fork weir has been an important tool for monitoring refuge-originating salmon stocks and assisting both Alaska Department of Fish and Game and Service inseason managers with management of the lower Yukon River fisheries. This project continues to build a long-term database that cannot be replicated in any other lower Yukon River drainage. The present weir project provides accurate escapement and biological data that dates back to 1994 for chum and chinook salmon, and 1995 for coho salmon. Prior data from 1981 through 1988 using sonar and tower methodology also adds to this important database. Recent literature (Beamish et al. 1998; Kruse 1998; Meyers et al. 1998) indicates that current and future maritime conditions may adversely affect salmon populations. If these conditions result in a trend of poor recruitment among Yukon River stocks, long-term operation of the East Fork weir will be of key importance and is recommended.

We recommend continuing weir operation into mid-September to obtain comprehensive escapement data for coho salmon returns.

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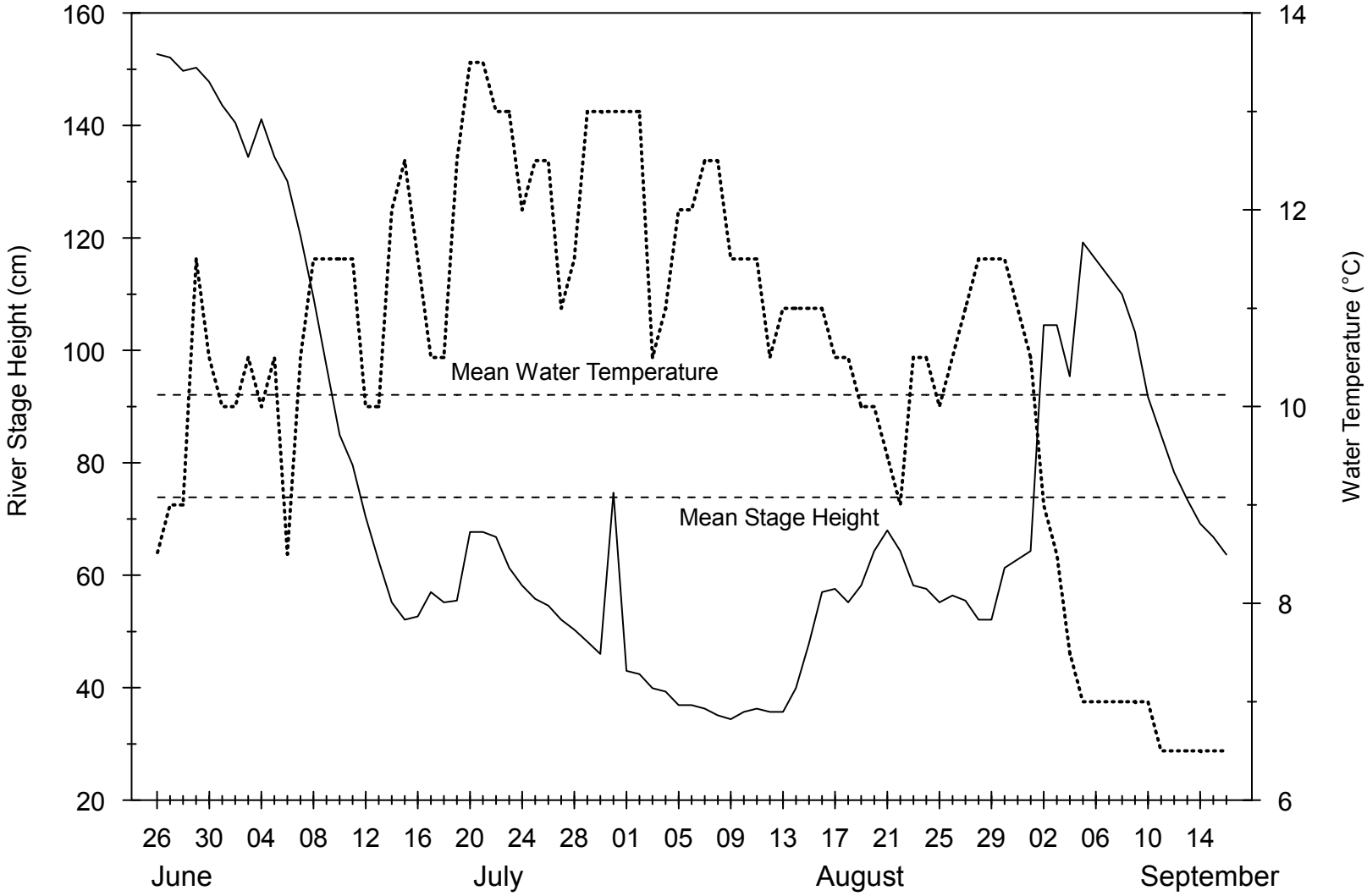

Appendix 1.—River stage heights and water temperatures at the East Fork Andreafsky River weir, 2001.

Appendix 2.—Daily escapement and counting effort at the East Fork Andreafsky River weir, Alaska, 2001.

Date	Counting Effort (hours)	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 1															
07/15 [a]	10.25	196	169	10	0	0	0	0	0	0	0	0	21	0	0
07/16	12.00	133	87	4	0	0	0	0	0	0	0	0	16	0	0
07/17	15.25	95	41	5	0	0	1	3	0	0	0	0	13	0	0
07/18	15.50	229	196	26	1	0	0	3	0	0	0	0	29	0	0
07/19	13.75	102	71	15	0	0	0	1	0	0	0	1	42	0	0
07/20	14.50	74	107	47	0	0	0	2	0	0	0	2	51	0	0
07/21	16.00	228	175	61	0	0	10	5	0	0	0	0	79	0	0
Total:	97.25	1,057	846	168	1	0	11	14	0	0	0	3	251	0	0
Stratum 2															
07/22	15.50	72	66	19	4	0	0	1	0	0	0	0	59	0	0
07/23	16.00	29	15	18	1	0	0	0	0	0	0	0	10	0	0
07/24	14.50	32	5	38	2	0	0	0	0	0	0	0	26	0	0
07/25	17.00	155	17	124	1	0	0	1	0	0	0	0	63	0	0
07/26	15.50	116	7	53	0	0	0	0	0	0	0	1	136	0	0
07/27	15.00	110	17	68	2	0	1	0	0	0	0	0	52	0	0
07/28	16.00	88	10	94	0	0	1	1	0	0	0	0	90	0	0
Total:	109.50	602	137	414	10	0	2	3	0	0	0	1	436	0	0
Stratum 3															
07/29	12.00	78	41	56	0	0	0	0	0	0	0	0	150	0	0
07/30	15.75	37	16	22	0	0	0	0	0	0	0	0	116	0	0
07/31	11.50	10	11	10	0	0	0	0	0	0	0	0	69	0	0
08/01	15.00	24	8	17	0	0	0	1	0	0	0	0	84	0	0
08/02	11.50	40	12	19	0	0	0	1	0	0	0	0	15	0	0
08/03	16.00	28	4	17	1	0	0	0	0	0	0	0	66	0	0
08/04	12.00	17	8	12	0	0	0	0	0	0	0	0	89	0	0
Total:	93.75	234	100	153	1	0	0	2	0	0	0	0	589	0	0

[a] No counts prior to July 15 due to high water. For estimated counts see Appendix 3.

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Appendix 2.—(Page 2 of 3)

Date	Counting Effort (hours)	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 4															
08/05	16.00	13	6	5	0	0	0	0	0	0	0	0	154	0	0
08/06	11.50	2	1	10	0	0	0	0	0	0	0	0	180	0	0
08/07	16.00	7	11	10	0	0	0	0	0	0	0	0	26	0	0
08/08	12.00	7	0	0	0	0	0	0	0	0	0	0	6	0	0
08/09	16.00	7	4	3	0	0	0	0	0	0	0	0	30	0	0
08/10	15.00	4	2	6	0	0	0	0	0	0	0	0	2	0	0
08/11	16.00	4	1	10	0	0	0	0	0	0	0	0	13	0	0
Total:	102.50	44	25	44	0	0	0	0	0	0	0	0	411	0	0
Stratum 5															
08/12	15.00	3	1	3	0	0	0	0	0	0	0	0	9	0	0
08/13	15.00	15	10	8	1	0	0	0	0	0	0	0	19	0	0
08/14	15.50	9	0	6	0	1	0	0	0	0	0	0	148	0	0
08/15	10.50	9	11	2	0	22	0	0	0	0	0	0	221	0	0
08/16	15.75	11	8	1	0	33	1	1	0	0	1	1	463	0	0
08/17	11.00	6	2	1	0	5	0	0	0	0	0	0	298	0	0
08/18	14.50	6	2	1	0	5	1	0	0	0	0	0	108	0	0
Total:	97.25	59	34	22	1	66	2	1	0	0	1	1	1,266	0	0
Stratum 6															
08/19	15.00	10	2	6	0	51	1	0	0	0	0	0	96	0	0
08/20	14.75	7	1	1	1	532	0	0	0	0	7	0	69	0	0
08/21	15.50	7	0	0	0	270	0	0	0	0	0	1	127	0	1
08/22	14.50	3	1	1	0	312	0	0	0	0	0	0	212	0	0
08/23	14.00	10	0	3	0	343	0	0	0	0	1	0	145	0	0
08/24	12.50	5	1	1	0	583	0	0	0	0	2	0	117	0	0
08/25	14.50	4	0	0	0	217	0	0	0	0	2	1	203	0	0
Total:	100.75	46	5	12	1	2,308	1	0	0	0	12	2	969	0	1

[a] No counts prior to July 15 due to high water. For estimated counts see Appendix 3.

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Appendix 2.—(Page 3 of 3)

Date	Counting Effort (hours)	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
						Stratum 7									
08/26	15.00	2	0	1	0	857	0	0	0	0	0	0	84	0	0
08/27	14.50	3	0	0	0	382	0	0	0	0	3	0	110	0	0
08/28	15.00	3	0	0	0	403	0	0	0	0	0	1	106	0	1
08/29	14.75	1	0	0	0	103	0	0	0	0	0	0	80	0	0
08/30	14.75	4	0	3	1	1,078	0	0	0	0	0	1	32	0	0
08/31	14.50	11	0	0	0	2,264	0	0	0	0	0	2	85	0	0
09/01	14.50	10	0	0	0	1,576	0	0	0	0	4	0	17	0	0
Total:	103.00	34	0	4	1	6,663	0	0	0	0	7	4	514	0	1
						Stratum 8									
09/02 [b]	0.00														
09/03 [b]	0.00														
09/04 [b]	0.00														
09/05 [b]	0.00														
09/06 [b]	0.00														
09/07 [b]	0.00														
09/08 [b]	0.00														
Total:	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
						Stratum 9									
09/09 [b]	0.00														
09/10 [c]	12.00	2	0	0	0	85	0	0	0	0	0	0	19	0	0
09/11	12.00	0	0	0	0	30	0	0	0	0	0	1	33	0	0
09/12	12.00	1	0	0	0	20	0	0	0	0	0	1	12	0	0
09/13	11.50	1	0	2	0	43	0	0	0	0	0	0	29	0	0
09/14	12.00	3	0	0	0	21	0	0	0	0	0	0	26	0	0
09/15	11.75	3	1	1	0	16	0	0	0	0	0	0	26	0	0
Total:	71.25	10	1	3	0	215	0	0	0	0	0	2	145	0	0
						Cumulative Totals									
Total:	775.25	2,086	1,148	820	15	9,252	16	20	0	0	20	13	4,581	0	2

[a] No counts prior to July 15 due to high water. For estimated counts see Appendix 3.

[b] No counts due to high water.

[c] Partial count due to submerged panels.

Appendix 3.—Daily chum and chinook salmon counts at the East Fork Andreafsky River weir, 1994-2001.

	Chum Salmon								(% passage) (1995-1999)[a]	Chinook Salmon								(% passage) (1995-1999)[a]
Date	1994	1995	1996	1997	1998	1999	2000	2001		1994	1995	1996	1997	1998	1999	2000	2001	
6/14																		
6/15				0									0					
6/16		52		1							0		0					
6/17		332		4		0					0		0		0			
6/18		191		71		0					0		0		0			
6/19		423	62	539		0					0	0	0		0			
6/20		2198	424	981		0					1	0	0		0			
6/21		861	3315	192		0					0	10	0		0			
6/22		1170	1036	53		0					1	0	0		0			
6/23		228	11195	3141	13	1		324	0.033		0	33	14	0	0		11	0.003
6/24		1951	798	1620	18	1		99	0.010		2	6	21	0	0		6	0.002
6/25		364	303	1422	264	0		71	0.007		0	0	59	0	0		13	0.004
6/26		504	7306	208	175	7		151	0.015		0	59	0	0	0		14	0.004
6/27		12620	3435	1691	535	8		285	0.029		41	42	101	1	0		36	0.011
6/28		11201	1463	1196	65	0		201	0.021		48	19	11	0	0		12	0.004
6/29	609	9256	2335	61	3153	331		260	0.027	1	67	6	1	10	0		11	0.003
6/30	19254	10938	314	80	4585	4459	837	535	0.055	188	104	8	0	34	47	9	29	0.009
7/1	12435	8654	9164	1537	4003	765	1725	484	0.050	141	81	72	75	93	19	16	62	0.018
7/2	2840	5553	3326	619	652	459	1460	193	0.020	54	71	21	24	17	9	39	23	0.007
7/3	4973	2710	8973	756	1687	24	1750	271	0.028	222	17	205	29	36	0	89	62	0.018
7/4	13321	10678	10018	1264	3561	3000	2070	634	0.065	156	55	124	49	75	12	74	61	0.018
7/5	12552	10026	7355	831	7996	4605	2300	787	0.081	651	107	309	98	336	97	38	181	0.053
7/6	4043	23584	3351	3428	6030	1185	3717	704	0.072	225	678	258	356	373	42	407	286	0.084
7/7	27527	8514	3124	2980	4696	1619	72	500	0.051	1156	433	280	227	386	114	18	252	0.074
7/8	5251	732	4771	2440	3088	1569	1548	371	0.038	108	155	244	123	204	197	71	175	0.051
7/9	3883	4808	3500	1799	845	1754	942	317	0.032	351	260	186	49	129	216	17	150	0.044
7/10	12416	6473	2303	3195	1003	2135	727	395	0.040	375	250	111	64	167	256	30	149	0.044
7/11	6896	6072	1275	1792	4003	1897	855	391	0.040	288	382	72	69	255	507	57	222	0.065
7/12	8424	3973	1497	1738	4401	501	477	296	0.030	581	1022	52	88	138	214	35	217	0.064
7/13	14628	4552	1680	1062	829	710	911	189	0.019	779	697	100	15	62	331	55	185	0.054
7/14	11611	2990	1038	1302	1248	1223	352	212	0.022	433	375	96	16	61	97	18	99	0.029

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Appendix 3.—(Page 2 of 4)

Date	Chum Salmon 1994	1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-1999)[a]	Chinook Salmon 1994	1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-1999)[a]
7/15	8275	2874	935	3222	2160	412	638	196		352	292	62	124	91	22	90	169	
7/16	4690	3449	1280	2441	2747	507		133		389	97	95	274	197	33		87	
7/17	4886	2739	774	1150	3038	547		95		144	46	110	91	263	75		41	
7/18	4532	1495	852	715	1580	494		229		285	38	55	25	184	63		196	
7/19	2977	651	1848	624	1365	666		102		161	25	42	70	240	65		71	
7/20	1091	1150	1721	1220	370	816	206	74		53	37	69	264	67	302	22	107	
7/21	1351	807	1116	800	335	242	424	228		66	74	51	148	129	55	12	175	
7/22	2228	591	605	668	304	240	280	72		62	33	26	35	117	67	21	66	
7/23	1320	742	246	405	248	201	116	29		209	24	2	103	57	15	6	15	
7/24	868	290	291	313	200	173	84	32		149	7	4	57	66	54	11	5	
7/25	1349	1214	196	121	220	131	159	155		25	78	6	0	12	24	10	17	
7/26	1977	521	365	339	166	73	130	116		51	21	3	11	8	5	9	7	
7/27	2196	605	278	400	130	132	64	110		92	12	6	3	8	34	7	17	
7/28	841	265	738	219	202	92	43	88		20	15	16	29	11	6	3	10	
7/29	564	211	334	234	145	245	173	78		10	9	13	58	23	159	57	41	
7/30	524	248	272	131	115	242	70	37		13	5	7	144	31	80	4	16	
7/31	410	94	260	86	140		172	10		10	1	10	2	17		20	11	
8/1	239	160	93	134	191		89	24		1	8	4	8	20		12	8	
8/2		81	158	81	91	118	125	40			2	2	4	4	18	4	12	
8/3		147	91	182	76	124	109	28			13	2	128	11	42	24	4	
8/4		59	192	48	56	117		17			5	5	2	1	11		8	
8/5		77	132	101	73	45		13			6	6	1	7	5		6	
8/6		115	215	77	71	17		2			6	2	0	9	2		1	
8/7		76	163	29	104	11	5	7			19	7	1	10	1	4	11	
8/8		78	54	31	77	16	12	7			20	3	2	3	4	7	0	
8/9		70	110	44	34	10	10	7			25	2	2	5	0	10	4	
8/10		61	137	17	57	32	13	4			25	5	1	7	1	3	2	
8/11		35	63	14	39	14	10	4			7	2	1	1	2	8	1	
8/12		60	65	65	77	29	9	3			4	3	7	8	5	4	1	
8/13		73	26	36	100	16	22	15			11	0	14	7	3	1	10	
8/14		62	35	33	58	6		9			2	0	18	1	9		0	
8/15		49	59	31	34	10	4	9			2	0	26	0	2	6	11	

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Appendix 3.—(Page 3 of 4)

Date	Chum Salmon 1994	1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-1999)[a]	Chinook Salmon 1994	1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-1999)[a]
8/16		95	80	46	32	13	4	11			3	3	2	12	4	2	8	
8/17		64	35	37		10	5	6			3	0	4		7	1	2	
8/18		83	33	58		6	13	6			3	2	3		3	2	2	
8/19		41	110	43	16	3	5	10			2	2	3	2	0	2	2	
8/20		45	33	95		3	3	7			1	3	2		6	3	1	
8/21		47	64	54		19	0	7			2	3	1		0	1	0	
8/22		43	27	37		2	1	3			0	0	4		1	1	1	
8/23		35	37	31		6	2	10			1	2	2		0	0	0	
8/24		35	26	41		5	4	5			1	0	1		0	1	1	
8/25		56	103	41		5	6	4			0	0	4		0	0	0	
8/26		53	35	18		2	19	2			0	1	0		1	2	0	
8/27		57	26	20		9	17	3			0	0	0		1	0	0	
8/28		31	39	38		7	13	3			3	0	1		0	0	0	
8/29		53	78	57	2	5	10	1			1	2	2	0	0	0	0	
8/30		34	66	73	4	11	9	4			0	1	3	1	0	0	0	
8/31		63	31	21	11	13	2	11			0	2	1	1	0	0	0	
9/1		48	38	14	8	18	6	10			1	0	0	0	0	0	0	
9/2		75	40	13	4	19	5				0	0	0	0	1	1		
9/3		36	49	53	5	15	4				0	0	4	0	0	0		
9/4		25	48	28	8	5	2				0	0	0	0	0	0		
9/5		30	37	38	1	4	1				1	0	1	0	1	0		
9/6		50	29	31	8	4					0	1	1	0	0			
9/7		60	50	51	6	3	1				0	0	0	1	0	0		
9/8		96	39	28	4	2	0				3	0	2	0	0	0		
9/9		42	32	22	3	2	0				0	0	1	1	0	0		
9/10		42	32	24	9	3	9	2			0	0	0	0	0	0	0	
9/11		37	24	48	10	4	3	0			0	0	0	1	0	0	0	
9/12		15	16	42	3		5	1			0	0	2	0		0	0	
9/13			18	23	4		1	1				0	0	0		0	0	
9/14			39				2	3				0				0	0	
9/15			33				5	3				0				0	1	
9/16			38				18					0				0		
9/17							3									0		
9/18							6									0		

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Appendix 3.—(Page 4 of 4)

	Chum Salmon								(% passage) (1995-1999)[a]	Chinook Salmon								(% passage) (1995-1999)[a]
Date	1994	1995	1996	1997	1998	1999	2000	2001		1994	1995	1996	1997	1998	1999	2000	2001	
9/19							4									0		
9/20							8									0		
9/21							10									0		
9/22							1									0		
9/23							1									0		
									% missed									% missed
	200,981	172,148	108,450	51,139	67,591	32,229	22,918	9,758	0.786	7,801	5,841	2,955	3,186	4,011	3,345	1,344	3,404	0.663

= estimated escapement

= no actual or estimated counts made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

Appendix 4.—Daily, cumulative, and cumulative proportion of chum, chinook, pink, and coho salmon escapement through the East Fork Andreafsky River weir, Alaska, 2001.

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
07/15	196	196	0.094	169	169	0.147	0	0	0.000	10	10	0.012	0	0	0.000
07/16	133	329	0.158	87	256	0.223	0	0	0.000	4	14	0.017	0	0	0.000
07/17	95	424	0.203	41	297	0.259	0	0	0.000	5	19	0.023	0	0	0.000
07/18	229	653	0.313	196	493	0.429	1	1	0.067	26	45	0.055	0	0	0.000
07/19	102	755	0.362	71	564	0.491	0	1	0.067	15	60	0.073	0	0	0.000
07/20	74	829	0.397	107	671	0.584	0	1	0.067	47	107	0.130	0	0	0.000
07/21	228	1,057	0.507	175	846	0.737	0	1	0.067	61	168	0.205	0	0	0.000
07/22	72	1,129	0.541	66	912	0.794	4	5	0.333	19	187	0.228	0	0	0.000
07/23	29	1,158	0.555	15	927	0.807	1	6	0.400	18	205	0.250	0	0	0.000
07/24	32	1,190	0.570	5	932	0.812	2	8	0.533	38	243	0.296	0	0	0.000
07/25	155	1,345	0.645	17	949	0.827	1	9	0.600	124	367	0.448	0	0	0.000
07/26	116	1,461	0.700	7	956	0.833	0	9	0.600	53	420	0.512	0	0	0.000
07/27	110	1,571	0.753	17	973	0.848	2	11	0.733	68	488	0.595	0	0	0.000
07/28	88	1,659	0.795	10	983	0.856	0	11	0.733	94	582	0.710	0	0	0.000
07/29	78	1,737	0.833	41	1,024	0.892	0	11	0.733	56	638	0.778	0	0	0.000
07/30	37	1,774	0.850	16	1,040	0.906	0	11	0.733	22	660	0.805	0	0	0.000
07/31	10	1,784	0.855	11	1,051	0.916	0	11	0.733	10	670	0.817	0	0	0.000
08/01	24	1,808	0.867	8	1,059	0.922	0	11	0.733	17	687	0.838	0	0	0.000
08/02	40	1,848	0.886	12	1,071	0.933	0	11	0.733	19	706	0.861	0	0	0.000
08/03	28	1,876	0.899	4	1,075	0.936	1	12	0.800	17	723	0.882	0	0	0.000
08/04	17	1,893	0.907	8	1,083	0.943	0	12	0.800	12	735	0.896	0	0	0.000
08/05	13	1,906	0.914	6	1,089	0.949	0	12	0.800	5	740	0.902	0	0	0.000
08/06	2	1,908	0.915	1	1,090	0.949	0	12	0.800	10	750	0.915	0	0	0.000
08/07	7	1,915	0.918	11	1,101	0.959	0	12	0.800	10	760	0.927	0	0	0.000
08/08	7	1,922	0.921	0	1,101	0.959	0	12	0.800	0	760	0.927	0	0	0.000
08/09	7	1,929	0.925	4	1,105	0.963	0	12	0.800	3	763	0.930	0	0	0.000
08/10	4	1,933	0.927	2	1,107	0.964	0	12	0.800	6	769	0.938	0	0	0.000
08/11	4	1,937	0.929	1	1,108	0.965	0	12	0.800	10	779	0.950	0	0	0.000
08/12	3	1,940	0.930	1	1,109	0.966	0	12	0.800	3	782	0.954	0	0	0.000

Boxed areas encompass second quartile, median, and third quartile. Chum and chinook salmon quartiles are missing due to insufficient data.

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Appendix 4.—(Page 2 of 3)

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
08/13	15	1,955	0.937	10	1,119	0.975	1	13	0.867	8	790	0.963	0	0	0.000
08/14	9	1,964	0.942	0	1,119	0.975	0	13	0.867	6	796	0.971	1	1	0.000
08/15	9	1,973	0.946	11	1,130	0.984	0	13	0.867	2	798	0.973	22	23	0.002
08/16	11	1,984	0.951	8	1,138	0.991	0	13	0.867	1	799	0.974	33	56	0.006
08/17	6	1,990	0.954	2	1,140	0.993	0	13	0.867	1	800	0.976	5	61	0.007
08/18	6	1,996	0.957	2	1,142	0.995	0	13	0.867	1	801	0.977	5	66	0.007
08/19	10	2,006	0.962	2	1,144	0.997	0	13	0.867	6	807	0.984	51	117	0.013
08/20	7	2,013	0.965	1	1,145	0.997	1	14	0.933	1	808	0.985	532	649	0.070
08/21	7	2,020	0.968	0	1,145	0.997	0	14	0.933	0	808	0.985	270	919	0.099
08/22	3	2,023	0.970	1	1,146	0.998	0	14	0.933	1	809	0.987	312	1,231	0.133
08/23	10	2,033	0.975	0	1,146	0.998	0	14	0.933	3	812	0.990	343	1,574	0.170
08/24	5	2,038	0.977	1	1,147	0.999	0	14	0.933	1	813	0.991	583	2,157	0.233
08/25	4	2,042	0.979	0	1,147	0.999	0	14	0.933	0	813	0.991	217	2,374	0.257
08/26	2	2,044	0.980	0	1,147	0.999	0	14	0.933	1	814	0.993	857	3,231	0.349
08/27	3	2,047	0.981	0	1,147	0.999	0	14	0.933	0	814	0.993	382	3,613	0.391
08/28	3	2,050	0.983	0	1,147	0.999	0	14	0.933	0	814	0.993	403	4,016	0.434
08/29	1	2,051	0.983	0	1,147	0.999	0	14	0.933	0	814	0.993	103	4,119	0.445
08/30	4	2,055	0.985	0	1,147	0.999	1	15	1.000	3	817	0.996	1,078	5,197	0.562
08/31	11	2,066	0.990	0	1,147	0.999	0	15	1.000	0	817	0.996	2,264	7,461	0.806
09/01	10	2,076	0.995	0	1,147	0.999	0	15	1.000	0	817	0.996	1,576	9,037	0.977
09/02 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/03 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/04 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/05 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/06 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/07 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/08 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/09 *		2,076	0.995		1,147	0.999		15	1.000		817	0.996		9,037	0.977
09/10	2	2,078	0.996	0	1,147	0.999	0	15	1.000	0	817	0.996	85	9,122	0.986

Boxed areas encompass second quartile, median, and third quartile.

* No counts due to high water.

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Appendix 4.—(Page 3 of 3)

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
09/11	0	2,078	0.996	0	1,147	0.999	0	15	1.000	0	817	0.996	30	9,152	0.989
09/12	1	2,079	0.997	0	1,147	0.999	0	15	1.000	0	817	0.996	20	9,172	0.991
09/13	1	2,080	0.997	0	1,147	0.999	0	15	1.000	2	819	0.999	43	9,215	0.996
09/14	3	2,083	0.999	0	1,147	0.999	0	15	1.000	0	819	0.999	21	9,236	0.998
09/15	3	2,086	1.000	1	1,148	1.000	0	15	1.000	1	820	1.000	16	9,252	1.000

Boxed areas encompass second quartile, median, and third quartile.

Appendix 5.—Estimated age and sex composition of weekly chum salmon escapements through the East Fork Andreafsky River weir, Alaska, 2001, and estimated design effects of the stratified sampling design.

		Brood Year and Age Group					
		1998	1997	1996	1995	1994	
		0.2	0.3	0.4	0.5	0.6	Total
Stratum 1:	07/15 - 07/21						
Sampling Dates:	07/16 - 07/20						
Male:	Number in Sample:	0	0	11	0	0	11
	Estimated % of Escapement:	0.0	0.0	44.0	0.0	0.0	44.0
	Estimated Escapement:	0	0	465	0	0	465
	Standard Error:	0.0	0.0	105.8	0.0	0.0	
Female:	Number in Sample:	0	2	12	0	0	14
	Estimated % of Escapement:	0.0	8.0	48.0	0.0	0.0	56.0
/	Estimated Escapement:	0	85	507	0	0	592
	Standard Error:	0.0	57.8	106.5	0.0	0.0	
Total:	Number in Sample:	0	2	23	0	0	25
	Estimated % of Escapement:	0.0	8.0	92.0	0.0	0.0	100.0
	Estimated Escapement:	0	85	972	0	0	1,057
	Standard Error:	0.0	57.8	57.8	0.0	0.0	
Stratum 2:	07/22 - 07/28						
Sampling Dates:	07/23 - 07/28						
Male:	Number in Sample:	0	6	22	1	0	29
	Estimated % of Escapement:	0.0	10.5	38.6	1.8	0.0	50.9
	Estimated Escapement:	0	63	232	11	0	306
	Standard Error:	0.0	23.5	37.3	10.0	0.0	
Female:	Number in Sample:	0	8	20	0	0	28
	Estimated % of Escapement:	0.0	14.0	35.1	0.0	0.0	49.1
	Estimated Escapement:	0	84	211	0	0	296
	Standard Error:	0.0	26.6	36.5	0.0	0.0	
Total:	Number in Sample:	0	14	42	1	0	57
	Estimated % of Escapement:	0.0	24.6	73.7	1.8	0.0	100.0
	Estimated Escapement:	0	148	444	11	0	602
	Standard Error:	0.0	32.9	33.7	10.0	0.0	
Stratum 3:	07/29 - 08/04						
Sampling Dates:	07/30 - 08/03						
Male:	Number in Sample:	0	0	8	1	0	9
	Estimated % of Escapement:	0.0	0.0	47.1	5.9	0.0	52.9
	Estimated Escapement:	0	0	159	20	0	178
	Standard Error:	0.0	0.0	41.0	19.3	0.0	
Female:	Number in Sample:	0	4	4	0	0	8
	Estimated % of Escapement:	0.0	23.5	23.5	0.0	0.0	47.1
	Estimated Escapement:	0	79	79	0	0	159
	Standard Error:	0.0	34.8	34.8	0.0	0.0	
Total:	Number in Sample:	0	4	12	1	0	17
	Estimated % of Escapement:	0.0	23.5	70.6	5.9	0.0	100.0
	Estimated Escapement:	0	79	238	20	0	337
	Standard Error:	0.0	34.8	37.4	19.3	0.0	

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Appendix 5.—(Page 2 of 2)

		Brood Year and Age Group					
		1998	1997	1996	1995	1994	
		0.2	0.3	0.4	0.5	0.6	Total
Strata 4 & 5:	08/05 - 08/18						
No Samples Collected							
Strata 6 & 7:	08/19 - 09/01						
Sampling Dates:	08/21 & 08/30						
Male:	Number in Sample:	0	0	0	0	0	0
	Estimated % of Escapement:	0.0	0.0	0.0	0.0	0.0	0.0
	Estimated Escapement:	0	0	0	0	0	0
	Standard Error:	0.0	0.0	0.0	0.0	0.0	
Female:	Number in Sample:	0	0	2	0	0	2
	Estimated % of Escapement:	0.0	0.0	100.0	0.0	0.0	100.0
	Estimated Escapement:	0	0	80	0	0	80
	Standard Error:	0.0	0.0	0.0	0.0	0.0	
Total:	Number in Sample:	0	0	2	0	0	2
	Estimated % of Escapement:	0.0	0.0	100.0	0.0	0.0	100.0
	Estimated Escapement:	0	0	80	0	0	80
	Standard Error:	0.0	0.0	0.0	0.0	0.0	
Strata 8 & 9:	09/02 - 09/15						
No Samples Collected							
Strata 1 - 15:	07/15 - 09/15						
Sampling Dates:	07/16 - 08/30						
Male:	Number in Sample:	0	6	41	2	0	49
	% Males in Age Group:	0.0	6.7	90.1	3.2	0.0	100.0
	Estimated % of Escapement:	0.0	3.1	41.2	1.5	0.0	45.8
	Estimated Escapement:	0	63	856	30	0	950
	Standard Error:	0.0	23.5	119.4	21.8	0.0	
	Estimated Design Effects:	0.000	0.478	1.415	0.812	0.000	1.389
Female:	Number in Sample:	0	14	38	0	0	52
	% Females in Age Group:	0.0	22.1	77.9	0.0	0.0	100.0
	Estimated % of Escapement:	0.0	12.0	42.3	0.0	0.0	54.2
	Estimated Escapement:	0	248	878	0	0	1,126
	Standard Error:	0.0	72.6	117.9	0.0	0.0	
	Estimated Design Effects:	0.000	1.208	1.366	0.000	0.000	1.389
Total:	Number in Sample:	0	20	79	2	0	101
	Estimated % of Escapement:	0.0	15.0	83.5	1.5	0.0	100.0
	Estimated Escapement:	0	312	1,734	30	0	2,076 *
	Standard Error:	0.0	75.1	76.7	21.8	0.0	
	Estimated Design Effects:	0.000	1.073	1.038	0.812	0.000	

* 10 fish that were counted through the weir during stratum 12 are not included in this total.

Appendix 6.—Length (mm) at age for chum salmon, East Fork Andreasfky River weir, Alaska, 2001.

		Brood Year and Age Group				
		1998	1997	1996	1995	1994
		0.2	0.3	0.4	0.5	0.6
Stratum 1:	07/15 - 07/21					
Sampling Dates:	07/16, 07/17, 07/19 & 07/20					
Male:	Mean Length			587		
	Std. Error			9		
	Range			530- 635		
	Sample Size	0	0	11	0	0
Female:	Mean Length		525	568		
	Std. Error		5	5		
	Range		520- 530	540- 595		
	Sample Size	0	2	12	0	0
Stratum 2:	07/22 - 07/28					
Sampling Dates:	07/23, 07/26, 07/27 & 07/28					
Male:	Mean Length		570	600	540	
	Std. Error		15	8		
	Range		535- 620	530- 655	540- 540	
	Sample Size	0	6	22	1	0
Female:	Mean Length		545	537		
	Std. Error		20	8		
	Range		450- 655	415- 575		
	Sample Size	0	8	20	0	0
Stratum 3:	07/29 - 08/04					
Sampling Dates:	07/30, 08/01, 08/02 & 08/03					
Male:	Mean Length			601	620	
	Std. Error			17		
	Range			535- 665	620- 620	
	Sample Size	0	0	8	1	0
Female:	Mean Length		511	569		
	Std. Error		13	5		
	Range		480- 545	555- 580		
	Sample Size	0	4	4	0	0
Strata 4 & 5:						
No Samples Collected						
Strata 6 & 7:	08/19 - 09/01					
Sampling Dates:	08/21 & 08/30					
Male:	Mean Length					
	Std. Error					
	Range					
	Sample Size	0	0	0	0	0
Female:	Mean Length			593		
	Std. Error			8		
	Range			585- 600		
	Sample Size	0	0	2	0	0

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Appendix 6.—(Page 2 of 2)

		Brood Year and Age Group				
		1998	1997	1996	1995	1994
		0.2	0.3	0.4	0.5	0.6
Strata 1 - 7:	07/15 - 09/01					
Sampling Dates:	07/16 - 08/30					
Male:	Mean Length		570	593	592	
	Std. Error		15	6		
	Range		535- 620	530- 665	540- 620	
	Sample Size	0	6	41	2	0
Female:	Mean Length		527	563		
	Std. Error		8	3		
	Range		450- 655	415- 600		
	Sample Size	0	14	38	0	0

Appendix 7.—Estimated age and sex composition of weekly chinook salmon escapements through the East Fork Andreafsky River weir, Alaska, 2001, and estimated design effects of the stratified design.

		Brood Year and Age Group							
		1997	1996		1995		1994	1993	
		1.2	1.3	2.2	1.4	2.3	1.5	1.6	Total
Stratum 1:	07/15 - 07/21								
Sampling Dates:	07/16 - 07/20								
Male:	Number in Sample:	13	9	0	6	0	1	0	29
	Estimated % of Escapement:	18.8	13.0	0.0	8.7	0.0	1.4	0.0	42.0
	Estimated Escapement:	159	110	0	74	0	12	0	356
	Standard Error:	38.4	33.1	0.0	27.7	0.0	11.8	0.0	
Female:	Number in Sample:	0	2	0	36	0	2	0	40
	Estimated % of Escapement:	0.0	2.9	0.0	52.2	0.0	2.9	0.0	58.0
	Estimated Escapement:	0	25	0	441	0	25	0	490
	Standard Error:	0.0	16.5	0.0	49.1	0.0	16.5	0.0	
Total:	Number in Sample:	13	11	0	42	0	3	0	69
	Estimated % of Escapement:	18.8	15.9	0.0	60.9	0.0	4.3	0.0	100.0
	Estimated Escapement:	159	135	0	515	0	37	0	846
	Standard Error:	38.4	36.0	0.0	48.0	0.0	20.1	0.0	
Stratum 2:	07/22 - 07/28								
Sampling Dates:	07/23, 07/26, 07/27 & 07/28								
Male:	Number in Sample:	4	0	0	2	0	0	0	6
	Estimated % of Escapement:	26.7	0.0	0.0	13.3	0.0	0.0	0.0	40.0
	Estimated Escapement:	37	0	0	18	0	0	0	55
	Standard Error:	15.3	0.0	0.0	11.7	0.0	0.0	0.0	
Female:	Number in Sample:	0	4	0	5	0	0	0	9
	Estimated % of Escapement:	0.0	26.7	0.0	33.3	0.0	0.0	0.0	60.0
	Estimated Escapement:	0	37	0	46	0	0	0	82
	Standard Error:	0.0	15.3	0.0	16.3	0.0	0.0	0.0	
Total:	Number in Sample:	4	4	0	7	0	0	0	15
	Estimated % of Escapement:	26.7	26.7	0.0	46.7	0.0	0.0	0.0	100.0
	Estimated Escapement:	37	37	0	64	0	0	0	137
	Standard Error:	15.3	15.3	0.0	17.2	0.0	0.0	0.0	
Strata 3 - 9:	07/29 - 09/15								
Sampling Dates:	07/29, 07/31 - 08/02 & 09/15								
Male:	Number in Sample:	1	6	0	3	0	0	0	10
	Estimated % of Escapement:	2.5	15.0	0.0	7.5	0.0	0.0	0.0	25.0
	Estimated Escapement:	4	25	0	12	0	0	0	41
	Standard Error:	3.6	8.2	0.0	6.1	0.0	0.0	0.0	
Female:	Number in Sample:	0	2	0	28	0	0	0	30
	Estimated % of Escapement:	0.0	5.0	0.0	70.0	0.0	0.0	0.0	75.0
	Estimated Escapement:	0	8	0	116	0	0	0	124
	Standard Error:	0.0	5.0	0.0	10.5	0.0	0.0	0.0	
Total:	Number in Sample:	1	8	0	31	0	0	0	40
	Estimated % of Escapement:	2.5	20.0	0.0	77.5	0.0	0.0	0.0	100.0
	Estimated Escapement:	4	33	0	128	0	0	0	165
	Standard Error:	3.6	9.2	0.0	9.6	0.0	0.0	0.0	

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Appendix 7.—(Page 2 of 2)

		Brood Year and Age Group							
		1997	1996		1995		1994	1993	
		1.2	1.3	2.2	1.4	2.3	1.5	1.6	Total
Strata 1 - 9:	07/15 - 09/15								
Sampling Dates:	07/16 - 09/15								
Male:	Number in Sample:	18	15	0	11	0	1	0	45
	% Males in Age Group:	44.3	29.9	0.0	23.1	0.0	2.7	0.0	100.0
	Estimated % of Escapement:	17.4	11.8	0.0	9.1	0.0	1.1	0.0	39.3
	Estimated Escapement:	200	135	0	104	0	12	0	452
	Standard Error:	41.5	34.1	0.0	30.7	0.0	11.8	0.0	
	Estimated Design Effects:	1.225	1.153	0.000	1.175	0.000	1.328	0.000	1.180
Female:	Number in Sample:	0	8	0	69	0	2	0	79
	% Females in Age Group:	0.0	10.0	0.0	86.5	0.0	3.5	0.0	100.0
	Estimated % of Escapement:	0.0	6.0	0.0	52.5	0.0	2.1	0.0	60.7
	Estimated Escapement:	0	69	0	603	0	25	0	696
	Standard Error:	0.0	23.0	0.0	52.8	0.0	16.5	0.0	
	Estimated Design Effects:	0.000	0.973	0.000	1.149	0.000	1.323	0.000	1.180
Total:	Number in Sample:	18	23	0	80	0	3	0	124
	Estimated % of Escapement:	17.4	17.8	0.0	61.6	0.0	3.2	0.0	100.0
	Estimated Escapement:	200	204	0	707	0	37	0	1,148
	Standard Error:	41.5	40.2	0.0	51.9	0.0	20.1	0.0	
	Estimated Design Effects:	1.225	1.138	0.000	1.168	0.000	1.317	0.000	

Appendix 8.—Length (mm) at age for chinook salmon, East Fork Andreafsky River weir Alaska, 2001.

		Brood Year and Age Group						
		1997	1996		1995		1994	1993
		1.2	1.3	2.2	1.4	2.3	1.5	1.6
Stratum 1:	07/15 - 07/21							
Sampling Dates:	07/16 - 07/20							
Male:	Mean Length	539	682		810		750	
	Std. Error	19	11		14			
	Range	435- 675	620- 740		755- 845		750- 750	
	Sample Size	13	9	0	6	0	1	0
Female:	Mean Length		805		868		885	
	Std. Error		25		7		30	
	Range		780- 830		775- 950	0	855- 915	
	Sample Size	0	2	0	36		2	0
Stratum 2:	07/22 - 07/28							
Sampling Dates:	07/23, 07/26, 07/27 & 07/28							
Male:	Mean Length	499			838			
	Std. Error	29			88			
	Range	435- 570			750- 925			
	Sample Size	4	0	0	2	0	0	0
Female:	Mean Length		825		831			
	Std. Error		33		42			
	Range		740- 899		670- 910			
	Sample Size	0	4	0	5	0	0	0
Strata 3 - 9:	07/29 - 09/15							
Sampling Dates:	07/29, 07/31 - 08/02 & 09/15							
Male:	Mean Length	425	701		748			
	Std. Error		33		8			
	Range	425- 425	625- 800		740- 765			
	Sample Size	1	6	0	3	0	0	0
Female:	Mean Length		828		870			
	Std. Error		3		7			
	Range		825- 830		775- 935			
	Sample Size	0	2	0	28	0	0	0
Strata 1 - 9:	07/15 - 09/15							
Sampling Dates:	07/16 - 09/15							
Male:	Mean Length	529	685		807		750	
	Std. Error	16	11		18			
	Range	425- 675	620- 800		740- 925		750- 750	
	Sample Size	18	15	0	11	0	1	0
Female:	Mean Length		818		865		885	
	Std. Error		19		6		30	
	Range		740- 899		670- 950		855- 915	
	Sample Size	0	8	0	69	0	2	0

Appendix 9.—Daily pink and coho salmon counts at the East Fork Andreafsky River weir, 1994-2001.

	Pink Salmon				(% passage) (1995-1999)[a]	Coho Salmon							(% passage) (1995-2000)[a]
Date	1995	1997	1999	2001		1995	1996	1997	1998	1999	2000	2001	
6/14													
6/15		0						0					
6/16	0	0				0		0					
6/17	0	0	0			0		0		0			
6/18	0	0	0			0		0		0			
6/19	0	0	0			0	0	0		0			
6/20	0	0	0			0	0	0		0			
6/21	0	0	0			0	0	0		0			
6/22	0	0	0			0	0	0		0			
6/23	0	0	0	0	0.000	0	0	0	0	0			
6/24	0	0	0	0	0.000	0	0	0	0	0			
6/25	0	0	0	0	0.000	0	0	0	0	0			
6/26	0	0	0	0	0.000	0	0	0	0	0			
6/27	1	1	0	1	0.001	0	0	0	0	0			
6/28	0	0	0	0	0.000	0	0	0	0	0			
6/29	2	0	0	0	0.000	0	0	0	0	0			
6/30	3	0	0	0	0.001	0	0	0	0	0	0		
7/1	13	2	0	4	0.004	0	0	0	0	0	0		
7/2	4	0	0	1	0.001	0	0	0	0	0	0		
7/3	4	0	0	1	0.001	0	0	0	0	0	0		
7/4	5	1	0	2	0.002	0	0	0	0	0	0		
7/5	9	0	0	1	0.002	0	0	0	0	0	0		
7/6	98	2	2	18	0.019	0	0	0	0	0	0		
7/7	77	0	2	13	0.014	0	0	0	0	0	0		
7/8	4	1	1	2	0.002	0	0	0	0	0	0		
7/9	18	2	2	5	0.005	0	0	0	0	0	0		
7/10	33	1	10	10	0.011	0	0	0	0	0	0		
7/11	23	2	20	14	0.014	0	0	0	0	0	0		
7/12	100	4	17	27	0.028	0	0	0	0	0	0		
7/13	109	6	18	30	0.031	0	0	0	0	0	0		
7/14	94	1	7	19	0.020	0	0	0	0	0	0		

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Date	Pink Salmon 1995	1997	1999	2001	(% passage) (1995-1999)[a]	Coho Salmon 1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-2000)[a]
7/15	81	35	2	10		0	0	0	0	0	0	0	
7/16	64	31	2	4		0	0	0	0	0		0	
7/17	60	13	4	5		0	0	0	0	0		0	
7/18	31	5	4	26		0	0	0	0	0		0	
7/19	15	6	14	15		0	0	0	0	0		0	
7/20	30	4	69	47		0	0	0	0	0	0	0	
7/21	40	4	38	61		0	0	0	0	0	0	0	
7/22	48	4	41	19		0	0	0	0	0	0	0	
7/23	77	5	25	18		0	11	0	0	0	0	0	
7/24	25	2	23	38		0	2	0	0	0	0	0	
7/25	216	0	22	124		0	1	0	0	0	0	0	
7/26	88	6	11	53		0	4	0	0	0	0	0	
7/27	37	13	24	68		0	0	0	0	0	0	0	
7/28	20	9	11	94		0	3	0	1	0	0	0	
7/29	14	20	26	56		0	3	0	0	0	0	0	
7/30	29	26	13	22		0	9	0	1	0	1	0	
7/31	11	2		10		0	25	0	0		1	0	
8/1	22	7		17		0	1	0	0		7	0	
8/2	23	2	5	19		0	7	0	1	0	9	0	
8/3	44	8	48	17		1	4	0	5	0	18	0	
8/4	20	3	60	12		0	15	0	8	9		0	
8/5	17	3	28	5		0	20	0	8	4		0	
8/6	22	1	14	10		0	10	0	5	4		0	
8/7	37	1	13	10		1	26	1	16	0	12	0	
8/8	20	5	19	0		1	20	0	9	0	35	0	
8/9	29	1	7	3		3	26	0	5	1	79	0	
8/10	46	4	16	6		8	138	0	8	2	125	0	
8/11	18	7	15	10		12	105	0	3	2	89	0	
8/12	11	6	17	3		5	50	10	4	5	51	0	
8/13	12	4	8	8		3	16	47	111	1	211	0	
8/14	32	3	5	6		3	11	35	71	1		1	
8/15	20	0	3	2		9	19	6	9	0	64	22	

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Date	Pink Salmon 1995	1997	1999	2001	(% passage) (1995-1999)[a]	Coho Salmon 1995	1996	1997	1998	1999	2000	2001	(% passage) (1995-2000)[a]
8/16	19	3	17	1		5	276	8	61	5	34	33	
8/17	17	5	1	1		11	92	7		2	23	5	
8/18	6	4	6	1		24	179	12		0	137	5	
8/19	7	2	0	6		41	1,052	13	8	0	108	51	
8/20	4	4	1	1		24	100	50		1	333	532	
8/21	7	1	1	0		95	149	414		42	303	270	
8/22	6	2	3	1		246	9	222		48	59	312	
8/23	4	2	2	3		305	32	22		0	10	343	
8/24	8	8	7	1		414	12	16		26	44	583	
8/25	3	10	1	0		245	1,539	577		8	533	217	
8/26	5	3	4	1		692	449	150		4	1,401	857	
8/27	9	1	1	0		1,436	5	10		4	1,643	382	
8/28	0	9	6	0		368	1	24		3	279	403	
8/29	7	15	6	0		938	179	2,335	371	0	626	103	
8/30	5	16	2	3		335	1,489	2,714	618	2	278	1078	
8/31	0	1	3	0		265	374	122	568	1	192	2264	
9/1	0	1	1	0		444	374	73	336	411	358	1576	
9/2	2	0	1	0		863	147	53	17	162	238	432	0.032
9/3	1	20	8	0		14	100	421	80	1255	162	1174	0.086
9/4	0	13	2	0		29	250	355	490	704	160	953	0.070
9/5	1	5	4	0		6	337	219	228	122	39	349	0.026
9/6	1	2	2	0		21	78	514	591	40		429	0.031
9/7	1	3	3	0		164	84	435	12	0	52	182	0.013
9/8	1	3	0	0		2,403	24	169	0	14	48	573	0.042
9/9	0	5	0	0		854	16	223	94	19	55	306	0.022
9/10	1	4	0	0		391	1	52	555	41	94	85	
9/11	0	12	3	0		127	0	83	1,104	20	31	30	
9/12	1	6		0		95	0	64	6		79	20	
9/13		6		2			0	16	13		30	43	
9/14				0			0				22	21	
9/15				1			3				16	16	
9/16							160				28		
9/17											19		
9/18											3		

= estimated escapement

= no counts, no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

-continued-

Appendix 9.—(Page 4 of 4)

	Pink Salmon				(% passage) (1995-1999)[a]	Coho Salmon							(% passage) (1995-2000)[a]
Date	1995	1997	1999	2001		1995	1996	1997	1998	1999	2000	2001	
9/19											5		
9/20											5		
9/21											34		
9/22											32		
9/23											10		
					% missed								% missed
	1,972	429	751	969	0.154	10,901	8,037	9,472	5,417	2,963	8,225	13,649	0.322

= estimated escapement

= no estimates made

[a] Proportions for days missed

Estimates were made using historical percent passage data from previous years with complete data.

Appendix 10.—Estimated age and sex composition of weekly coho salmon escapements through the East Fork Andreafsky River weir, Alaska, 2001, and estimated design effects of the stratified sampling design.

		Brood Year and Age Group				
		1998	1997	1996	1996	
		1.1	2.1	2.2	3.1	Total
Strata 1 - 5:	07/15 - 08/18					
No Samples Collected						
Stratum 6:	08/19 - 08/25					
Sampling Dates:	08/21 - 08/25					
Male:	Number in Sample:	4	71	3	0	78
	Estimated % of Escapement:	3.1	55.0	2.3	0.0	60.5
	Estimated Escapement:	72	1,270	54	0	1,396
	Standard Error:	34.4	98.6	29.9	0.0	
Female:	Number in Sample:	1	47	3	0	51
	Estimated % of Escapement:	0.8	36.4	2.3	0.0	39.5
	Estimated Escapement:	18	841	54	0	912
	Standard Error:	17.4	95.4	29.9	0.0	
Total:	Number in Sample:	5	118	6	0	129
	Estimated % of Escapement:	3.9	91.5	4.7	0.0	100.0
	Estimated Escapement:	89	2,111	107	0	2,308
	Standard Error:	38.3	55.4	41.7	0.0	
Stratum 7:	08/26 - 09/01					
Sampling Dates:	08/26 - 08/31					
Male:	Number in Sample:	1	73	2	0	76
	Estimated % of Escapement:	0.8	57.5	1.6	0.0	59.8
	Estimated Escapement:	52	3,830	105	0	3,987
	Standard Error:	52.0	290.6	73.2	0.0	
Female:	Number in Sample:	1	49	1	0	51
	Estimated % of Escapement:	0.8	38.6	0.8	0.0	40.2
	Estimated Escapement:	52	2,571	52	0	2,676
	Standard Error:	52.0	286.2	52.0	0.0	
Total:	Number in Sample:	2	122	3	0	127
	Estimated % of Escapement:	1.6	96.1	2.4	0.0	100.0
	Estimated Escapement:	105	6,401	157	0	6,663
	Standard Error:	73.2	114.3	89.3	0.0	
Stratum 8:	09/02 - 09/08					
No Samples Collected						

-continued-

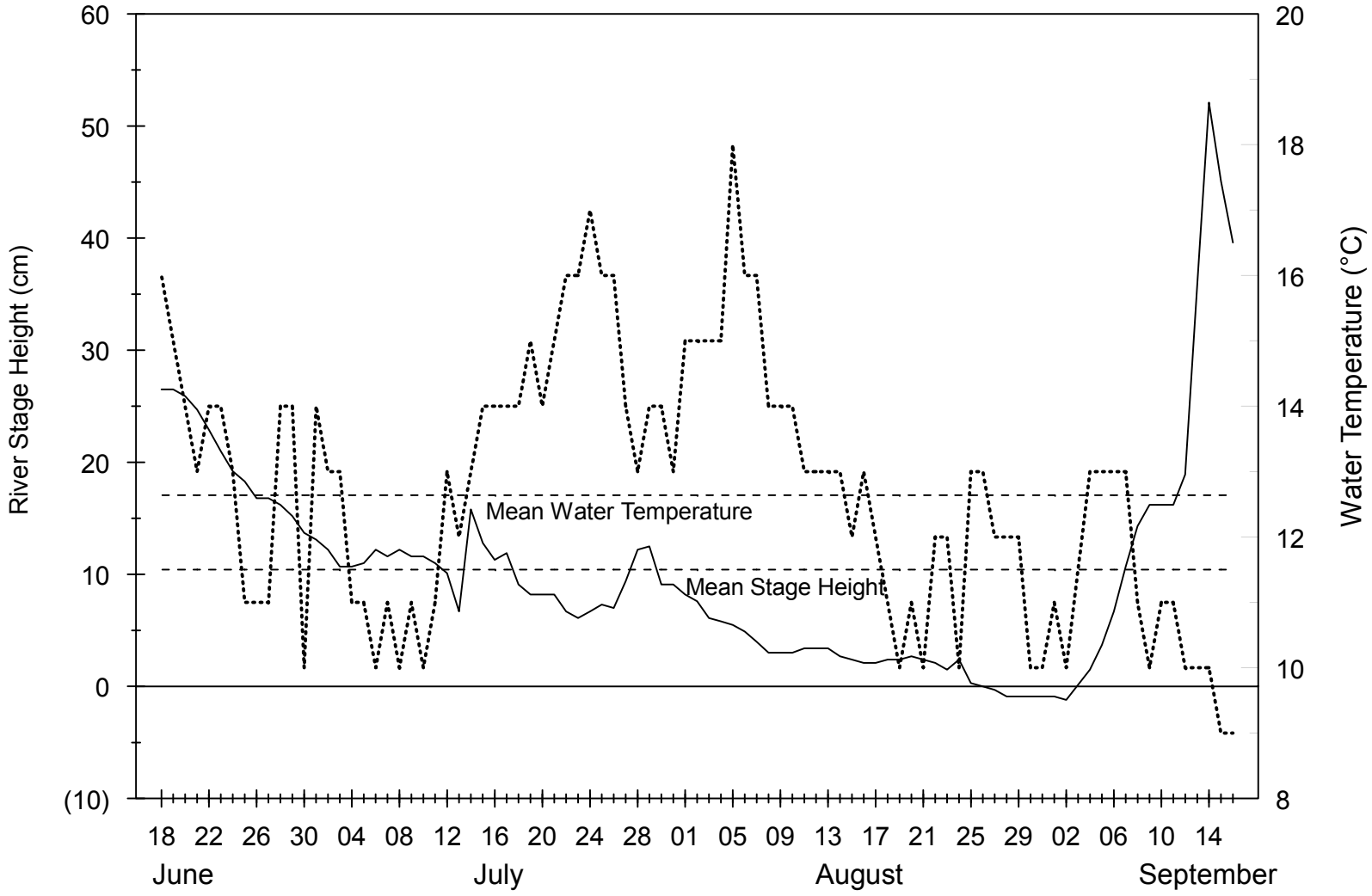
Appendix 10.—(Page 2 of 2)

		Brood Year and Age Group				
		1998	1997	1996	1996	
		1.1	2.1	2.2	3.1	Total
Stratum 9:	09/09 - 09/15					
Sampling Dates:	09/13 - 09/15					
Male:	Number in Sample:	1	16	0	0	17
	Estimated % of Escapement:	2.6	42.1	0.0	0.0	44.7
	Estimated Escapement:	6	91	0	0	96
	Standard Error:	5.1	15.8	0.0	0.0	
Female:	Number in Sample:	0	21	0	0	21
	Estimated % of Escapement:	0.0	55.3	0.0	0.0	55.3
	Estimated Escapement:	0	119	0	0	119
	Standard Error:	0.0	15.9	0.0	0.0	
Total:	Number in Sample:	1	37	0	0	38
	Estimated % of Escapement:	2.6	97.4	0.0	0.0	100.0
	Estimated Escapement:	6	209	0	0	215
	Standard Error:	5.1	5.1	0.0	0.0	
Strata 1 - 9:	07/15 - 09/15					
Sampling Dates:	08/21 - 09/15					
Male:	Number in Sample:	6	160	5	0	171
	% Males in Age Group:	2.4	94.7	2.9	0.0	100.0
	Estimated % of Escapement:	1.4	56.5	1.7	0.0	59.6
	Estimated Escapement:	130	5,191	159	0	5,479
	Standard Error:	62.5	307.3	79.1	0.0	
	Estimated Design Effects:	1.007	1.366	1.311	0.000	1.369
Female:	Number in Sample:	2	117	4	0	123
	% Females in Age Group:	1.9	95.2	2.9	0.0	100.0
	Estimated % of Escapement:	0.8	38.4	1.2	0.0	40.4
	Estimated Escapement:	70	3,530	106	0	3,707
	Standard Error:	54.8	302.1	59.9	0.0	
	Estimated Design Effects:	1.404	1.371	1.124	0.000	1.369
Total:	Number in Sample:	8	277	9	0	294
	Estimated % of Escapement:	2.2	94.9	2.9	0.0	100.0
	Estimated Escapement:	200	8,721	265	0	9,186 *
	Standard Error:	82.7	127.1	98.6	0.0	
	Estimated Design Effects:	1.148	1.200	1.237	0.000	

* 66 fish that were counted through stratum 5 were not included in this total.

Appendix 11.—Length (mm) at age for coho salmon, East Fork Andreafsky River weir, Alaska, 2001.

		Brood Year and Age Group			
		1998	1997	1996	
		1.1	2.1	2.2	3.1
Strata 1 - 5:	07/15 - 08/18				
No Samples Collected					
Stratum 6:	08/19 - 08/25				
Sampling Dates:	08/21 - 08/25				
Male:	Mean Length	561	561	517	
	Std. Error	17	6	32	
	Range	515- 595	450- 640	460- 570	
	Sample Size	4	71	3	0
Female:	Mean Length	625	559	570	
	Std. Error		5	8	
	Range	625- 625	435- 615	560- 585	
	Sample Size	1	47	3	0
Stratum 7:	08/26 - 09/01				
Sampling Dates:	08/26 - 08/31				
Male:	Mean Length	580	570	520	
	Std. Error		4		
	Range	580- 580	470- 650	520- 520	
	Sample Size	1	73	2	0
Female:	Mean Length	540	559	590	
	Std. Error		4		
	Range	540- 540	480- 610	590- 590	
	Sample Size	1	49	1	0
Stratum 8:	09/02 - 09/08				
No Samples Collected					
Stratum 9:	09/09 - 09/15				
Sampling Dates:	09/13 - 09/15				
Male:	Mean Length	580	548		
	Std. Error		16		
	Range	580- 580	375- 610		
	Sample Size	1	16	0	0
Female:	Mean Length		565		
	Std. Error		3		
	Range		540- 600		
	Sample Size	0	21	0	0
Strata 1 - 9:	07/15 - 09/15				
Sampling Dates:	08/21 - 09/15				
Male:	Mean Length	570	567	519	
	Std. Error	17	3	11	
	Range	515- 595	375- 650	460- 570	
	Sample Size	6	160	5	0
Female:	Mean Length	562	559	580	
	Std. Error		3	8	
	Range	540- 625	435- 615	560- 590	
	Sample Size	2	117	4	0



Appendix 12.—River stage heights and water temperatures at the East Fork Andreafsky River weir, 2002.

Appendix 13.—Daily escapement and counting effort at the East Fork Andreafsky River weir, Alaska, 2002.

Date	Counting Effort (hours)[a]	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 1															
06/19	3.50	0	0	0	0	0	0	0	0	0	0	0	2	0	0
06/20	18.25	0	0	0	0	0	0	0	0	0	0	0	3	1	2
06/21	27.00	117	1	52	0	0	0	0	0	0	0	0	9	1	1
06/22	29.50	1,782	20	462	0	0	15	0	0	0	0	0	21	1	1
Total:	78.25	1,899	21	514	0	0	15	0	0	0	0	0	35	3	4
Stratum 2															
06/23	17.50	0	0	0	0	0	0	0	0	0	0	0	8	0	0
06/24	17.50	6	0	22	0	0	1	0	0	0	0	0	2	1	0
06/25	24.25	522	3	148	0	0	8	0	0	0	0	0	5	0	0
06/26	25.00	694	1	338	0	0	9	0	0	0	0	0	7	1	0
06/27	23.75	2,448	26	431	0	0	31	2	0	0	0	0	27	0	0
06/28	41.25	6,754	314	7,808	0	0	68	3	0	0	0	0	130	0	0
06/29	28.50	1,765	119	5,076	0	0	21	1	0	0	0	0	67	0	0
Total:	177.75	12,189	463	13,823	0	0	138	6	0	0	0	0	246	2	0
Stratum 3															
06/30	21.00	836	27	1,509	0	0	1	0	0	0	0	0	25	0	0
07/01	23.50	4,403	319	6,192	0	0	8	1	0	0	0	0	61	0	0
07/02	21.00	2,467	105	3,345	0	0	8	2	0	0	0	0	25	0	0
07/03	27.25	2,291	230	6,876	0	0	6	1	0	0	0	0	44	0	0
07/04	17.75	28	5	257	0	0	0	0	0	0	0	0	5	0	0
07/05	25.50	347	20	1,626	0	0	1	0	0	0	0	0	5	0	0
07/06	30.25	4,423	356	13,433	1	0	32	9	0	0	0	0	14	1	1
Total:	166.25	14,795	1,062	33,238	1	0	56	13	0	0	0	0	179	1	1

[a] Counting effort may exceed 24 hours if more than one passage chute is monitored.

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Appendix 13.—(Page 2 of 5)

Date	Counting Effort (hours)[a]	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 4															
07/07	28.75	2,254	307	10,268	0	0	11	1	0	0	0	0	35	0	0
07/08	20.50	845	130	4,815	0	0	0	0	0	0	0	0	26	1	0
07/09	23.50	2,265	178	8,765	0	0	5	1	0	0	0	1	71	0	1
07/10	29.50	1,732	191	12,942	0	0	9	4	0	0	0	0	162	0	0
07/11	21.75	1,221	264	10,764	0	0	9	4	0	0	0	0	178	0	2
07/12	24.25	1,099	166	9,207	1	0	4	2	0	0	0	0	108	0	0
07/13	21.75	1,055	191	9,161	0	0	3	2	0	0	0	0	50	0	0
Total:	170.00	10,471	1,427	65,922	1	0	41	14	0	0	0	1	630	1	3
Stratum 5															
07/14	22.25	544	158	7,819	0	0	6	0	0	0	0	0	56	0	0
07/15	21.50	1,014	140	6,958	0	0	3	1	0	0	0	0	108	0	1
07/16	21.50	581	210	8,224	3	0	0	2	0	0	0	0	96	1	0
07/17	19.75	420	119	6,724	1	0	1	0	0	0	0	0	93	0	0
07/18	22.00	492	94	8,701	2	0	4	0	0	0	0	0	136	1	1
07/19	24.25	392	75	6,058	3	0	3	0	0	0	0	0	217	0	0
07/20	18.00	192	50	1,983	1	0	0	0	0	0	0	0	64	0	0
Total:	149.25	3,635	846	46,467	10	0	17	3	0	0	0	0	770	2	2
Stratum 6															
07/21	17.00	153	29	1,239	1	0	0	0	0	0	0	0	50	0	0
07/22	19.00	61	12	564	1	0	0	0	0	0	0	0	22	0	0
07/23	17.25	201	32	1,060	2	0	0	1	0	0	0	0	32	0	0
07/24	21.00	98	16	1,092	4	0	0	0	0	0	0	0	38	0	0
07/25	21.25	26	7	385	0	0	0	0	0	0	0	0	32	0	0
07/26	23.75	22	3	429	0	0	0	0	0	0	0	0	6	0	0
07/27	17.50	60	6	232	1	0	0	0	0	0	0	0	4	0	0
Total:	136.75	621	105	5,001	9	0	0	1	0	0	0	0	184	0	0

[a] Counting effort may exceed 24 hours if more than one passage chute is monitored.

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Appendix 13.—(Page 3 of 5)

Date	Counting Effort (hours)[a]	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 7															
07/28	18.00	123	3	305	2	0	0	0	0	0	0	0	16	0	0
07/29	15.50	17	4	49	0	0	0	0	0	0	0	0	22	0	0
07/30	15.00	36	2	62	0	0	1	0	0	0	0	0	17	0	0
07/31	17.75	119	46	232	4	0	0	0	0	0	0	0	50	0	0
08/01	20.75	81	55	131	3	0	0	0	0	0	0	0	206	0	0
08/02	21.50	33	48	61	3	0	0	1	0	0	0	0	120	1	0
08/03	22.00	36	10	73	0	0	0	0	0	0	0	0	162	0	0
Total:	130.50	445	168	913	12	0	1	1	0	0	0	0	593	1	0
Stratum 8															
08/04	11.00	40	3	34	0	1	0	0	0	0	0	0	107	1	0
08/05	12.25	3	3	11	0	0	0	0	0	0	0	0	53	0	0
08/06	20.50	7	4	13	1	0	0	0	0	0	0	0	31	0	0
08/07	7.75	13	4	7	0	0	0	0	0	0	0	0	7	0	0
08/08	6.25	5	0	4	0	0	0	0	0	0	0	0	9	0	0
08/09	9.00	5	0	5	1	0	0	0	0	0	0	0	4	0	0
08/10	10.00	13	0	9	1	1	0	0	0	0	0	0	3	0	0
Total:	76.75	86	14	83	3	2	0	0	0	0	0	0	214	1	0
Stratum 9															
08/11	11.75	11	4	2	0	0	1	0	0	0	0	0	2	0	0
08/12	13.75	2	0	4	2	0	0	0	0	0	0	0	3	0	0
08/13	14.00	0	1	1	0	0	0	0	0	0	0	0	3	0	0
08/14	9.00	0	1	4	0	0	0	0	0	0	0	0	2	0	0
08/15	5.50	1	0	1	0	0	0	0	0	0	0	0	0	0	0
08/16	13.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0
08/17	7.25	1	3	1	0	0	0	0	0	0	0	0	0	0	0
Total:	74.50	21	9	13	2	0	1	0	0	0	0	0	10	0	0

[a] Counting effort may exceed 24 hours if more than one passage chute is monitored.

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Appendix 13.—(Page 4 of 5)

Date	Counting Effort (hours)[a]	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 10															
08/18	11.00	2	0	0	0	0	0	0	0	0	0	0	0	0	0
08/19	6.00	0	1	0	0	1	0	0	0	0	0	1	8	0	0
08/20	14.50	2	0	0	0	0	0	0	0	0	0	0	1	0	0
08/21	17.00	0	0	1	0	0	0	0	0	0	0	0	14	0	0
08/22	18.75	2	5	1	0	3	0	0	0	0	0	0	17	0	0
08/23	20.50	3	0	2	0	6	0	0	0	0	0	0	45	0	0
08/24	22.00	3	1	3	1	3	0	0	0	0	0	0	19	0	1
Total:	109.75	12	7	7	1	13	0	0	0	0	0	1	104	0	1
Stratum 11															
08/25	22.00	3	0	1	0	7	0	0	0	0	0	0	29	0	0
08/26	21.00	1	0	0	1	0	0	0	0	0	0	0	2	0	0
08/27	20.25	0	0	0	0	0	0	0	0	0	0	0	2	0	0
08/28	19.75	1	0	0	0	2	0	0	0	0	0	0	1	0	0
08/29	5.50	0	0	0	1	0	0	0	0	0	0	0	2	1	0
08/30	14.25	0	1	1	0	0	0	0	0	0	0	0	4	0	0
08/31	11.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total:	113.75	5	1	2	2	9	0	0	0	0	0	0	40	1	0
Stratum 12															
09/01	17.00	0	0	1	0	0	0	0	0	0	0	0	0	0	0
09/02 [b]	0.00														
09/03 [b]	0.00														
09/04	5.00	0	0	0	0	43	0	0	0	0	1	0	0	0	0
09/05	8.00	0	0	2	0	640	0	0	0	0	3	0	19	0	0
09/06	9.25	0	0	0	0	738	0	0	0	0	2	0	13	0	0
09/07	11.75	1	0	0	1	413	0	0	0	0	7	0	27	0	0
Total:	51.00	1	0	3	1	1,834	0	0	0	0	13	0	59	0	0

[a] Counting effort may exceed 24 hours if more than one passage chute is monitored.

[b] No counts, passage chutes left open

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Appendix 13.—(Page 5 of 5)

Date	Counting Effort (hours)[a]	Chum Salmon	Chinook Salmon	Pink Salmon	Sockeye Salmon	Coho Salmon	Gill Net Marks: Chum Salmon	Gill Net Marks: Chinook Salmon	Gill Net Marks: Pink Salmon	Gill Net Marks: Sockeye Salmon	Gill Net Marks: Coho Salmon	Dolly Varden	Whitefish	Northern Pike	Arctic Grayling
Stratum 13															
09/08	12.50	0	0	0	0	345	0	0	0	0	0	0	55	0	0
09/09	14.00	0	0	1	1	103	0	0	0	0	0	0	32	0	0
09/10	13.00	2	0	0	0	237	0	0	0	0	3	0	8	0	0
09/11	13.00	1	0	1	0	117	0	0	0	0	0	0	14	0	0
09/12	13.00	8	0	2	0	726	0	0	0	0	6	0	129	0	0
09/13	13.00	2	0	0	0	113	0	0	0	0	0	0	199	0	0
09/14	13.00	1	0	0	0	35	0	0	0	0	0	0	85	0	0
Total:	91.50	14	0	4	1	1,676	0	0	0	0	9	0	522	0	0
Cumulative Totals															
Total:	1526.00	44,194	4,123	165,990	43	3,534	269	38	0	0	22	2	3,586	12	11

[a] Counting effort may exceed 24 hours if more than one passage chute is monitored.

[b] No counts, passage chutes left open

Appendix 14.—Daily, cumulative, and cumulative proportion of chum, chinook, pink, and coho salmon escapement through the East Fork Andreafsky River weir, Alaska, 2002.

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
06/17															
06/18															
06/19	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000
06/20	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000
06/21	117	117	0.003	1	1	0.000	0	0	0.000	52	52	0.000	0	0	0.000
06/22	1,782	1,899	0.043	20	21	0.005	0	0	0.000	462	514	0.003	0	0	0.000
06/23	0	1,899	0.043	0	21	0.005	0	0	0.000	0	514	0.003	0	0	0.000
06/24	6	1,905	0.043	0	21	0.005	0	0	0.000	22	536	0.003	0	0	0.000
06/25	522	2,427	0.055	3	24	0.006	0	0	0.000	148	684	0.004	0	0	0.000
06/26	694	3,121	0.071	1	25	0.006	0	0	0.000	338	1,022	0.006	0	0	0.000
06/27	2,448	5,569	0.126	26	51	0.012	0	0	0.000	431	1,453	0.009	0	0	0.000
06/28	6,754	12,323	0.279	314	365	0.089	0	0	0.000	7,808	9,261	0.056	0	0	0.000
06/29	1,765	14,088	0.319	119	484	0.117	0	0	0.000	5,076	14,337	0.086	0	0	0.000
06/30	836	14,924	0.338	27	511	0.124	0	0	0.000	1,509	15,846	0.095	0	0	0.000
07/01	4,403	19,327	0.437	319	830	0.201	0	0	0.000	6,192	22,038	0.133	0	0	0.000
07/02	2,467	21,794	0.493	105	935	0.227	0	0	0.000	3,345	25,383	0.153	0	0	0.000
07/03	2,291	24,085	0.545	230	1,165	0.283	0	0	0.000	6,876	32,259	0.194	0	0	0.000
07/04	28	24,113	0.546	5	1,170	0.284	0	0	0.000	257	32,516	0.196	0	0	0.000
07/05	347	24,460	0.553	20	1,190	0.289	0	0	0.000	1,626	34,142	0.206	0	0	0.000
07/06	4,423	28,883	0.654	356	1,546	0.375	1	1	0.023	13,433	47,575	0.287	0	0	0.000
07/07	2,254	31,137	0.705	307	1,853	0.449	0	1	0.023	10,268	57,843	0.348	0	0	0.000
07/08	845	31,982	0.724	130	1,983	0.481	0	1	0.023	4,815	62,658	0.377	0	0	0.000
07/09	2,265	34,247	0.775	178	2,161	0.524	0	1	0.023	8,765	71,423	0.430	0	0	0.000
07/10	1,732	35,979	0.814	191	2,352	0.570	0	1	0.023	12,942	84,365	0.508	0	0	0.000
07/11	1,221	37,200	0.842	264	2,616	0.634	0	1	0.023	10,764	95,129	0.573	0	0	0.000

Boxed areas encompass first quarter, median, and third quartile.

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Appendix 14.—(Page 2 of 4)

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
07/12	1,099	38,299	0.867	166	2,782	0.675	1	2	0.047	9,207	104,336	0.629	0	0	0.000
07/13	1,055	39,354	0.890	191	2,973	0.721	0	2	0.047	9,161	113,497	0.684	0	0	0.000
07/14	544	39,898	0.903	158	3,131	0.759	0	2	0.047	7,819	121,316	0.731	0	0	0.000
07/15	1,014	40,912	0.926	140	3,271	0.793	0	2	0.047	6,958	128,274	0.773	0	0	0.000
07/16	581	41,493	0.939	210	3,481	0.844	3	5	0.116	8,224	136,498	0.822	0	0	0.000
07/17	420	41,913	0.948	119	3,600	0.873	1	6	0.140	6,724	143,222	0.863	0	0	0.000
07/18	492	42,405	0.960	94	3,694	0.896	2	8	0.186	8,701	151,923	0.915	0	0	0.000
07/19	392	42,797	0.968	75	3,769	0.914	3	11	0.256	6,058	157,981	0.952	0	0	0.000
07/20	192	42,989	0.973	50	3,819	0.926	1	12	0.279	1,983	159,964	0.964	0	0	0.000
07/21	153	43,142	0.976	29	3,848	0.933	1	13	0.302	1,239	161,203	0.971	0	0	0.000
07/22	61	43,203	0.978	12	3,860	0.936	1	14	0.326	564	161,767	0.975	0	0	0.000
07/23	201	43,404	0.982	32	3,892	0.944	2	16	0.372	1,060	162,827	0.981	0	0	0.000
07/24	98	43,502	0.984	16	3,908	0.948	4	20	0.465	1,092	163,919	0.988	0	0	0.000
07/25	26	43,528	0.985	7	3,915	0.950	0	20	0.465	385	164,304	0.990	0	0	0.000
07/26	22	43,550	0.985	3	3,918	0.950	0	20	0.465	429	164,733	0.992	0	0	0.000
07/27	60	43,610	0.987	6	3,924	0.952	1	21	0.488	232	164,965	0.994	0	0	0.000
07/28	123	43,733	0.990	3	3,927	0.952	2	23	0.535	305	165,270	0.996	0	0	0.000
07/29	17	43,750	0.990	4	3,931	0.953	0	23	0.535	49	165,319	0.996	0	0	0.000
07/30	36	43,786	0.991	2	3,933	0.954	0	23	0.535	62	165,381	0.996	0	0	0.000
07/31	119	43,905	0.993	46	3,979	0.965	4	27	0.628	232	165,613	0.998	0	0	0.000
08/01	81	43,986	0.995	55	4,034	0.978	3	30	0.698	131	165,744	0.999	0	0	0.000
08/02	33	44,019	0.996	48	4,082	0.990	3	33	0.767	61	165,805	0.999	0	0	0.000
08/03	36	44,055	0.997	10	4,092	0.992	0	33	0.767	73	165,878	0.999	0	0	0.000
08/04	40	44,095	0.998	3	4,095	0.993	0	33	0.767	34	165,912	1.000	1	1	0.000
08/05	3	44,098	0.998	3	4,098	0.994	0	33	0.767	11	165,923	1.000	0	1	0.000
08/06	7	44,105	0.998	4	4,102	0.995	1	34	0.791	13	165,936	1.000	0	1	0.000
08/07	13	44,118	0.998	4	4,106	0.996	0	34	0.791	7	165,943	1.000	0	1	0.000

Boxed areas encompass first quarter, median, and third quartile.

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Appendix 14.—(Page 3 of 4)

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
08/08	5	44,123	0.998	0	4,106	0.996	0	34	0.791	4	165,947	1.000	0	1	0.000
08/09	5	44,128	0.999	0	4,106	0.996	1	35	0.814	5	165,952	1.000	0	1	0.000
08/10	13	44,141	0.999	0	4,106	0.996	1	36	0.837	9	165,961	1.000	1	2	0.001
08/11	11	44,152	0.999	4	4,110	0.997	0	36	0.837	2	165,963	1.000	0	2	0.001
08/12	2	44,154	0.999	0	4,110	0.997	2	38	0.884	4	165,967	1.000	0	2	0.001
08/13	0	44,154	0.999	1	4,111	0.997	0	38	0.884	1	165,968	1.000	0	2	0.001
08/14	0	44,154	0.999	1	4,112	0.997	0	38	0.884	4	165,972	1.000	0	2	0.001
08/15	1	44,155	0.999	0	4,112	0.997	0	38	0.884	1	165,973	1.000	0	2	0.001
08/16	6	44,161	0.999	0	4,112	0.997	0	38	0.884	0	165,973	1.000	0	2	0.001
08/17	1	44,162	0.999	3	4,115	0.998	0	38	0.884	1	165,974	1.000	0	2	0.001
08/18	2	44,164	0.999	0	4,115	0.998	0	38	0.884	0	165,974	1.000	0	2	0.001
08/19	0	44,164	0.999	1	4,116	0.998	0	38	0.884	0	165,974	1.000	1	3	0.001
08/20	2	44,166	0.999	0	4,116	0.998	0	38	0.884	0	165,974	1.000	0	3	0.001
08/21	0	44,166	0.999	0	4,116	0.998	0	38	0.884	1	165,975	1.000	0	3	0.001
08/22	2	44,168	0.999	5	4,121	1.000	0	38	0.884	1	165,976	1.000	3	6	0.002
08/23	3	44,171	0.999	0	4,121	1.000	0	38	0.884	2	165,978	1.000	6	12	0.003
08/24	3	44,174	1.000	1	4,122	1.000	1	39	0.907	3	165,981	1.000	3	15	0.004
08/25	3	44,177	1.000	0	4,122	1.000	0	39	0.907	1	165,982	1.000	7	22	0.006
08/26	1	44,178	1.000	0	4,122	1.000	1	40	0.930	0	165,982	1.000	0	22	0.006
08/27	0	44,178	1.000	0	4,122	1.000	0	40	0.930	0	165,982	1.000	0	22	0.006
08/28	1	44,179	1.000	0	4,122	1.000	0	40	0.930	0	165,982	1.000	2	24	0.007
08/29	0	44,179	1.000	0	4,122	1.000	1	41	0.953	0	165,982	1.000	0	24	0.007
08/30	0	44,179	1.000	1	4,123	1.000	0	41	0.953	1	165,983	1.000	0	24	0.007
08/31	0	44,179	1.000	0	4,123	1.000	0	41	0.953	0	165,983	1.000	0	24	0.007
09/01	0	44,179	1.000	0	4,123	1.000	0	41	0.953	1	165,984	1.000	0	24	0.007
09/02 *		44,179	1.000		4,123	1.000		41	0.953		165,984	1.000		24	0.007

Boxed areas encompass first quarter, median, and third quartile.

* No counts, passage chutes left open

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Appendix 14.—(Page 4 of 4)

	Chum Salmon			Chinook Salmon			Sockeye Salmon			Pink Salmon			Coho Salmon		
	Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative		Daily	Cumulative	
Date	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion	Count	Count	Proportion
09/03 *		44,179	1.000		4,123	1.000		41	0.953		165,984	1.000		24	0.007
09/04	0	44,179	1.000	0	4,123	1.000	0	41	0.953	0	165,984	1.000	43	67	0.019
09/05	0	44,179	1.000	0	4,123	1.000	0	41	0.953	2	165,986	1.000	640	707	0.200
09/06	0	44,179	1.000	0	4,123	1.000	0	41	0.953	0	165,986	1.000	738	1,445	0.409
09/07	1	44,180	1.000	0	4,123	1.000	1	42	0.977	0	165,986	1.000	413	1,858	0.526
09/08	0	44,180	1.000	0	4,123	1.000	0	42	0.977	0	165,986	1.000	345	2,203	0.623
09/09	0	44,180	1.000	0	4,123	1.000	1	43	1.000	1	165,987	1.000	103	2,306	0.653
09/10	2	44,182	1.000	0	4,123	1.000	0	43	1.000	0	165,987	1.000	237	2,543	0.720
09/11	1	44,183	1.000	0	4,123	1.000	0	43	1.000	1	165,988	1.000	117	2,660	0.753
09/12	8	44,191	1.000	0	4,123	1.000	0	43	1.000	2	165,990	1.000	726	3,386	0.958
09/13	2	44,193	1.000	0	4,123	1.000	0	43	1.000	0	165,990	1.000	113	3,499	0.990
09/14	1	44,194	1.000	0	4,123	1.000	0	43	1.000	0	165,990	1.000	35	3,534	1.000

Boxed areas encompass first quarter, median, and third quartile.

* No counts, passage chutes left open

Appendix 15.—Estimated age and sex composition of weekly chum salmon escapements through the East Fork Andreafsky River weir, Alaska, 2002, and estimated design effects of the stratified sampling design.

		Brood Year and Age Group					
		1999	1998	1997	1996	1995	
		0.2	0.3	0.4	0.5	0.6	Total
Stratum 1:	06/16 - 06/22						
Sampling Dates:	06/22						
Male:	Number in Sample:	0	15	0	0	0	15
	Estimated % of Escapement:	0.0	39.5	0.0	0.0	0.0	39.5
	Estimated Escapement:	0	750	0	0	0	750
	Standard Error:	0.0	151.1	0.0	0.0	0.0	
Female:	Number in Sample:	0	20	0	3	0	23
	Estimated % of Escapement:	0.0	52.6	0.0	7.9	0.0	60.5
	Estimated Escapement:	0	999	0	150	0	1,149
	Standard Error:	0.0	154.3	0.0	83.3	0.0	
Total:	Number in Sample:	0	35	0	3	0	38
	Estimated % of Escapement:	0.0	92.1	0.0	7.9	0.0	100.0
	Estimated Escapement:	0	1,749	0	150	0	1,899
	Standard Error:	0.0	83.3	0.0	83.3	0.0	
Stratum 2:	06/23 - 06/29						
Sampling Dates:	06/25 - 06/28						
Male:	Number in Sample:	0	64	13	4	0	81
	Estimated % of Escapement:	0.0	43.0	8.7	2.7	0.0	54.4
	Estimated Escapement:	0	5,236	1,063	327	0	6,626
	Standard Error:	0.0	492.9	281.0	161.0	0.0	
Female:	Number in Sample:	0	52	13	3	0	68
	Estimated % of Escapement:	0.0	34.9	8.7	2.0	0.0	45.6
	Estimated Escapement:	0	4,254	1,063	245	0	5,563
	Standard Error:	0.0	474.6	281.0	139.9	0.0	
Total:	Number in Sample:	0	116	26	7	0	149
	Estimated % of Escapement:	0.0	77.9	17.4	4.7	0.0	100.0
	Estimated Escapement:	0	9,489	2,127	573	0	12,189
	Standard Error:	0.0	413.5	377.9	210.7	0.0	
Stratum 3:	06/30 - 07/06						
Sampling Dates:	06/30 - 07/02						
Male:	Number in Sample:	0	65	7	2	1	75
	Estimated % of Escapement:	0.0	46.4	5.0	1.4	0.7	53.6
	Estimated Escapement:	0	6,869	740	211	106	7,926
	Standard Error:	0.0	622.9	272.2	148.2	105.2	
Female:	Number in Sample:	0	49	12	4	0	65
	Estimated % of Escapement:	0.0	35.0	8.6	2.9	0.0	46.4
	Estimated Escapement:	0	5,178	1,268	423	0	6,869
	Standard Error:	0.0	595.7	349.6	208.1	0.0	
Total:	Number in Sample:	0	114	19	6	1	140
	Estimated % of Escapement:	0.0	81.4	13.6	4.3	0.7	100.0
	Estimated Escapement:	0	12,047	2,008	634	106	14,795
	Standard Error:	0.0	485.7	427.7	253.0	105.2	

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		Brood Year and Age Group					
		1999	1998	1997	1996	1995	
		0.2	0.3	0.4	0.5	0.6	Total
Stratum 4:	07/07 - 07/13						
Sampling Dates:	07/07 - 07/09						
Male:	Number in Sample:	1	47	6	1	2	57
	Estimated % of Escapement:	0.7	33.1	4.2	0.7	1.4	40.1
	Estimated Escapement:	74	3,466	442	74	147	4,203
	Standard Error:	73.2	412.1	176.2	73.2	103.2	
Female:	Number in Sample:	1	70	14	0	0	85
	Estimated % of Escapement:	0.7	49.3	9.9	0.0	0.0	59.9
	Estimated Escapement:	74	5,162	1,032	0	0	6,268
	Standard Error:	73.2	437.9	261.1	0.0	0.0	
Total:	Number in Sample:	2	117	20	1	2	142
	Estimated % of Escapement:	1.4	82.4	14.1	0.7	1.4	100.0
	Estimated Escapement:	147	8,628	1,475	74	147	10,471
	Standard Error:	103.2	333.6	304.7	73.2	103.2	
Stratum 5:	07/14 - 07/20						
Sampling Dates:	07/14 - 07/18						
Male:	Number in Sample:	0	52	7	1	0	60
	Estimated % of Escapement:	0.0	37.7	5.1	0.7	0.0	43.5
	Estimated Escapement:	0	1,370	184	26	0	1,580
	Standard Error:	0.0	147.6	66.8	25.8	0.0	
Female:	Number in Sample:	0	70	5	3	0	78
	Estimated % of Escapement:	0.0	50.7	3.6	2.2	0.0	56.5
	Estimated Escapement:	0	1,844	132	79	0	2,055
	Standard Error:	0.0	152.3	56.9	44.4	0.0	
Total:	Number in Sample:	0	122	12	4	0	138
	Estimated % of Escapement:	0.0	88.4	8.7	2.9	0.0	100.0
	Estimated Escapement:	0	3,214	316	105	0	3,635
	Standard Error:	0.0	97.5	85.8	51.1	0.0	
Stratum 6:	07/21 - 07/27						
Sampling Dates:	07/21 - 07/27						
Male:	Number in Sample:	0	37	4	2	0	43
	Estimated % of Escapement:	0.0	37.8	4.1	2.0	0.0	43.9
	Estimated Escapement:	0	234	25	13	0	272
	Standard Error:	0.0	28.1	11.4	8.2	0.0	
Female:	Number in Sample:	1	45	9	0	0	55
	Estimated % of Escapement:	1.0	45.9	9.2	0.0	0.0	56.1
	Estimated Escapement:	6	285	57	0	0	349
	Standard Error:	5.8	28.8	16.7	0.0	0.0	
Total:	Number in Sample:	1	82	13	2	0	98
	Estimated % of Escapement:	1.0	83.7	13.3	2.0	0.0	100.0
	Estimated Escapement:	6	520	82	13	0	621
	Standard Error:	5.8	21.4	19.6	8.2	0.0	

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		Brood Year and Age Group					
		1999	1998	1997	1996	1995	
		0.2	0.3	0.4	0.5	0.6	Total
Stratum 7:	07/28 - 08/03						
Sampling Dates:	07/28 - 08/02						
Male:	Number in Sample:	1	21	1	0	0	23
	Estimated % of Escapement:	1.4	30.4	1.4	0.0	0.0	33.3
	Estimated Escapement:	6	135	6	0	0	148
	Standard Error:	5.9	22.8	5.9	0.0	0.0	
Female:	Number in Sample:	3	39	4	0	0	46
	Estimated % of Escapement:	4.3	56.5	5.8	0.0	0.0	66.7
	Estimated Escapement:	19	252	26	0	0	297
	Standard Error:	10.1	24.6	11.6	0.0	0.0	
Total:	Number in Sample:	4	60	5	0	0	69
	Estimated % of Escapement:	5.8	87.0	7.2	0.0	0.0	100.0
	Estimated Escapement:	26	387	32	0	0	445
	Standard Error:	11.6	16.7	12.9	0.0	0.0	
Stratum 8:	08/04 - 09/14						
No Samples Collected							
Strata 1 - 13:	06/16 - 09/14						
Sampling Dates:	06/28 - 07/30						
Male:	Number in Sample:	2	301	38	10	3	354
	% Males in Age Group:	0.4	84.0	11.4	3.0	1.2	100.0
	Estimated % of Escapement:	0.2	41.0	5.6	1.5	0.6	48.8
	Estimated Escapement:	80	18,060	2,462	651	253	21,506
	Standard Error:	73.5	920.2	434.4	232.3	147.4	
	Estimated Design Effects:	1.201	1.412	1.442	1.493	1.531	1.397
Female:	Number in Sample:	5	345	57	13	0	420
	% Females in Age Group:	0.4	79.7	15.9	4.0	0.0	100.0
	Estimated % of Escapement:	0.2	40.8	8.1	2.0	0.0	51.2
	Estimated Escapement:	99	17,974	3,578	897	0	22,549
	Standard Error:	74.2	905.7	522.5	267.9	0.0	
	Estimated Design Effects:	0.990	1.370	1.475	1.451	0.000	1.397
Total:	Number in Sample:	7	646	95	23	3	774
	Estimated % of Escapement:	0.4	81.8	13.7	3.5	0.6	100.0
	Estimated Escapement:	180	36,033	6,040	1,548	253	44,055 *
	Standard Error:	104.0	731.7	653.1	351.2	147.4	
	Estimated Design Effects:	1.079	1.449	1.453	1.466	1.531	

* 139 fish that were counted through the weir during strata 8 - 13 are not included in this total.

Appendix 16.—Length (mm) at age for chum salmon, East Fork Andreafsky River weir, Alaska, 2002.

		Brood Year and Age Group				
		1999	1998	1997	1996	1995
		0.2	0.3	0.4	0.5	0.6
Stratum 1:	06/16 - 06/22					
Sampling Dates:	06/22					
Male:	Mean Length		583			
	Std. Error		5			
	Range		555- 610			
	Sample Size	0	15	0	0	0
Female:	Mean Length		545		553	
	Std. Error		5		22	
	Range		510- 580		510- 580	
	Sample Size	0	20	0	3	0
Stratum 2:	06/23 - 06/29					
Sampling Dates:	06/25 - 06/28					
Male:	Mean Length		585	595	608	
	Std. Error		3	8	5	
	Range		530- 635	560- 640	600- 620	
	Sample Size	0	64	13	4	0
Female:	Mean Length		553	565	568	
	Std. Error		3	7	2	
	Range		505- 600	510- 610	565- 570	
	Sample Size	0	52	13	3	0
Stratum 3:	06/30 - 07/06					
Sampling Dates:	06/30 - 07/02					
Male:	Mean Length		577	589	643	540
	Std. Error		4	11	33	
	Range		520- 655	540- 620	610- 675	540- 540
	Sample Size	0	65	7	2	1
Female:	Mean Length		530	547	564	
	Std. Error		4	9	18	
	Range		465- 570	500- 610	515- 590	
	Sample Size	0	49	12	4	0
Stratum 4:	07/07 - 07/13					
Sampling Dates:	07/07 - 07/09					
Male:	Mean Length	605	574	588	630	610
	Std. Error		4	13		
	Range	605- 605	490- 655	550- 630	630- 630	610- 610
	Sample Size	1	47	6	1	2
Female:	Mean Length	505	534	561		
	Std. Error		3	7		
	Range	505- 505	480- 590	520- 615		
	Sample Size	1	70	14	0	0

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		Brood Year and Age Group				
		1999	1998	1997	1996	1995
		0.2	0.3	0.4	0.5	0.6
Stratum 5:	07/14 - 07/20					
Sampling Dates:	07/14 - 07/18					
Male:	Mean Length		561	570	590	
	Std. Error		4	17		
	Range		500- 620	510- 650	590- 590	
	Sample Size	0	52	7	1	0
Female:	Mean Length		524	537	558	
	Std. Error		3	13	12	
	Range		470- 620	490- 560	535- 570	
	Sample Size	0	70	5	3	0
Stratum 6:	07/21 - 07/27					
Sampling Dates:	07/21 - 07/27					
Male:	Mean Length		558	594	628	
	Std. Error		5	19	3	
	Range		480- 625	540- 620	625- 630	
	Sample Size	0	37	4	2	0
Female:	Mean Length	535	521	543		
	Std. Error		3	12		
	Range	535- 535	475- 565	485- 590		
	Sample Size	1	45	9	0	0
Stratum 7:	07/28 - 08/03					
Sampling Dates:	07/28 - 08/02					
Male:	Mean Length	520	551	555		
	Std. Error		8			
	Range	520- 520	465- 600	555- 555		
	Sample Size	1	21	1	0	0
Female:	Mean Length	482	515	553		
	Std. Error	4	5	15		
	Range	475- 490	425- 575	520- 590		
	Sample Size	3	39	4	0	0
Strata 8 - 13:	08/04 - 09/14					
No Samples Collected						
Strata 1 - 13:	06/16 - 09/14					
Sampling Dates:	06/22 - 08/02					
Male:	Mean Length	598	577	590	621	581
	Std. Error		2	6	13	
	Range	520- 605	465- 655	510- 650	590- 675	540- 610
	Sample Size	2	301	38	10	3
Female:	Mean Length	502	536	556	563	
	Std. Error	4	2	4	9	
	Range	475- 535	425- 620	485- 615	510- 590	
	Sample Size	5	345	57	13	0

Appendix 17.—Estimated age and sex composition of weekly chinook salmon escapements through the East Fork Andreafsky River weir, Alaska, 2002, and estimated design effects of the stratified sampling design.

		Brood Year and Age Group							
		1998	1997		1996		1995	1994	
		1.2	1.3	2.2	1.4	2.3	1.5	1.6	Total
Stratum 1:	06/16 - 06/22								
No Samples Collected									
Stratum 2:	06/23 - 06/29								
Sampling Dates:	06/28								
Female:	Number in Sample:	0	0	0	2	0	0	0	2
	Estimated % of Escapement:	0.0	0.0	0.0	22.2	0.0	0.0	0.0	22.2
	Estimated Escapement:	0	0	0	108	0	0	0	108
	Standard Error:	0.0	0.0	0.0	70.5	0.0	0.0	0.0	
Male:	Number in Sample:	3	2	0	2	0	0	0	7
	Estimated % of Escapement:	33.3	22.2	0.0	22.2	0.0	0.0	0.0	77.8
	Estimated Escapement:	161	108	0	108	0	0	0	376
	Standard Error:	79.9	70.5	0.0	70.5	0.0	0.0	0.0	
Total:	Number in Sample:	3	2	0	4	0	0	0	9
	Estimated % of Escapement:	33.3	22.2	0.0	44.4	0.0	0.0	0.0	100.0
	Estimated Escapement:	161	108	0	215	0	0	0	484
	Standard Error:	79.9	70.5	0.0	84.2	0.0	0.0	0.0	
Stratum 3:	06/30 - 07/06								
Sampling Dates:	07/01 - 07/06								
Female:	Number in Sample:	1	5	0	13	0	1	0	20
	Estimated % of Escapement:	1.7	8.6	0.0	22.4	0.0	1.7	0.0	34.5
	Estimated Escapement:	18	92	0	238	0	18	0	366
	Standard Error:	17.8	38.4	0.0	57.0	0.0	17.8	0.0	
Male:	Number in Sample:	17	16	0	5	0	0	0	38
	Estimated % of Escapement:	29.3	27.6	0.0	8.6	0.0	0.0	0.0	65.5
	Estimated Escapement:	311	293	0	92	0	0	0	696
	Standard Error:	62.3	61.1	0.0	38.4	0.0	0.0	0.0	
Total:	Number in Sample:	18	21	0	18	0	1	0	58
	Estimated % of Escapement:	31.0	36.2	0.0	31.0	0.0	1.7	0.0	100.0
	Estimated Escapement:	330	385	0	330	0	18	0	1,062
	Standard Error:	63.3	65.7	0.0	63.3	0.0	17.8	0.0	
Stratum 4:	07/07 - 07/13								
Sampling Dates:	07/07 - 07/13								
Female:	Number in Sample:	0	19	0	21	0	2	0	42
	Estimated % of Escapement:	0.0	8.6	0.0	9.5	0.0	0.9	0.0	19.0
	Estimated Escapement:	0	123	0	136	0	13	0	271
	Standard Error:	0.0	24.8	0.0	25.9	0.0	8.4	0.0	
Male:	Number in Sample:	83	83	0	13	0	0	0	179
	Estimated % of Escapement:	37.6	37.6	0.0	5.9	0.0	0.0	0.0	81.0
	Estimated Escapement:	536	536	0	84	0	0	0	1,156
	Standard Error:	42.8	42.8	0.0	20.8	0.0	0.0	0.0	
Total:	Number in Sample:	83	102	0	34	0	2	0	221
	Estimated % of Escapement:	37.6	46.2	0.0	15.4	0.0	0.9	0.0	100.0
	Estimated Escapement:	536	659	0	220	0	13	0	1,427
	Standard Error:	42.8	44.1	0.0	31.9	0.0	8.4	0.0	

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Appendix 17.—(Page 2 of 3)

		Brood Year and Age Group							
		1998	1997		1996		1995	1994	
		1.2	1.3	2.2	1.4	2.3	1.5	1.6	Total
Stratum 5:	07/14 - 07/20								
Sampling Dates:	07/14 - 07/20								
Female:	Number in Sample:	0	7	0	9	0	2	0	18
	Estimated % of Escapement:	0.0	6.4	0.0	8.3	0.0	1.8	0.0	16.5
	Estimated Escapement:	0	54	0	70	0	16	0	140
	Standard Error:	0.0	18.6	0.0	20.9	0.0	10.2	0.0	
Male:	Number in Sample:	20	58	0	12	0	1	0	91
	Estimated % of Escapement:	18.3	53.2	0.0	11.0	0.0	0.9	0.0	83.5
	Estimated Escapement:	155	450	0	93	0	8	0	706
	Standard Error:	29.4	37.9	0.0	23.8	0.0	7.2	0.0	
Total:	Number in Sample:	20	65	0	21	0	3	0	109
	Estimated % of Escapement:	18.3	59.6	0.0	19.3	0.0	2.8	0.0	100.0
	Estimated Escapement:	155	504	0	163	0	23	0	846
	Standard Error:	29.4	37.3	0.0	30.0	0.0	12.4	0.0	
Stratum 6:	07/21 - 07/27								
Sampling Dates:	07/21 - 07/25, & 07/27								
Female:	Number in Sample:	0	2	0	7	0	0	0	9
	Estimated % of Escapement:	0.0	5.7	0.0	20.0	0.0	0.0	0.0	25.7
	Estimated Escapement:	0	6	0	21	0	0	0	27
	Standard Error:	0.0	3.4	0.0	5.9	0.0	0.0	0.0	
Male:	Number in Sample:	8	16	0	2	0	0	0	26
	Estimated % of Escapement:	22.9	45.7	0.0	5.7	0.0	0.0	0.0	74.3
	Estimated Escapement:	24	48	0	6	0	0	0	78
	Standard Error:	6.2	7.3	0.0	3.4	0.0	0.0	0.0	
Total:	Number in Sample:	8	18	0	9	0	0	0	35
	Estimated % of Escapement:	22.9	51.4	0.0	25.7	0.0	0.0	0.0	100.0
	Estimated Escapement:	24	54	0	27	0	0	0	105
	Standard Error:	6.2	7.3	0.0	6.4	0.0	0.0	0.0	
Stratum 7:	07/28 - 08/03								
Sampling Dates:	07/29 & 07/30								
Female:	Number in Sample:	0	0	0	1	0	0	0	1
	Estimated % of Escapement:	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0
	Estimated Escapement:	0	0	0	42	0	0	0	42
	Standard Error:	0.0	0.0	0.0	41.5	0.0	0.0	0.0	
Male:	Number in Sample:	1	2	0	0	0	0	0	3
	Estimated % of Escapement:	25.0	50.0	0.0	0.0	0.0	0.0	0.0	75.0
	Estimated Escapement:	42	84	0	0	0	0	0	126
	Standard Error:	41.5	47.9	0.0	0.0	0.0	0.0	0.0	
Total:	Number in Sample:	1	2	0	1	0	0	0	4
	Estimated % of Escapement:	25.0	50.0	0.0	25.0	0.0	0.0	0.0	100.0
	Estimated Escapement:	42	84	0	42	0	0	0	168
	Standard Error:	41.5	47.9	0.0	41.5	0.0	0.0	0.0	

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		Brood Year and Age Group							
		1998	1997		1996		1995	1994	
		1.2	1.3	2.2	1.4	2.3	1.5	1.6	Total
Strata 8 - 13:	08/04								
No Samples Collected									
Strata 1 - 13:	06/16 - 09/14								
Sampling Dates:	06/28 - 07/30								
Female:	Number in Sample:	1	33	0	53	0	5	0	92
	% Females in Age Group:	1.9	28.8	0.0	64.4	0.0	4.9	0.0	100.0
	Estimated % of Escapement:	0.4	6.7	0.0	15.0	0.0	1.1	0.0	23.3
	Estimated Escapement:	18	275	0	614	0	47	0	954
	Standard Error:	17.8	49.5	0.0	105.3	0.0	22.2	0.0	
	Estimated Design Effects:	1.955	1.121	0.000	2.366	0.000	1.237	0.000	1.991
Male:	Number in Sample:	132	177	0	34	0	1	0	344
	% Males in Age Group:	39.2	48.4	0.0	12.2	0.0	0.2	0.0	100.0
	Estimated % of Escapement:	30.1	37.1	0.0	9.3	0.0	0.2	0.0	76.7
	Estimated Escapement:	1,230	1,519	0	382	0	8	0	3,138
	Standard Error:	121.3	119.7	0.0	86.3	0.0	7.2	0.0	
	Estimated Design Effects:	1.927	1.699	0.000	2.393	0.000	0.827	0.000	1.991
Total:	Number in Sample:	133	210	0	87	0	6	0	436
	Estimated % of Escapement:	30.5	43.8	0.0	24.3	0.0	1.3	0.0	100.0
	Estimated Escapement:	1,248	1,793	0	996	0	55	0	4,092 *
	Standard Error:	121.9	122.4	0.0	121.6	0.0	23.3	0.0	
	Estimated Design Effects:	1.927	1.684	0.000	2.190	0.000	1.177	0.000	

* 31 fish that were counted through the weir during strata 8 - 13 are not included in this total.

Appendix 18.—Length (mm) at age for chinook salmon, East Fork Andreafsky River weir, Alaska, 2002.

		Brood Year and Age Class						
		1998	1997		1996		1995	1994
		1.2	1.3	2.2	1.4	2.3	1.5	1.6
Stratum 1:	06/16 - 06/22							
No Samples Collected								
Stratum 2:	06/23 - 06/29							
Sampling Dates:	06/28							
Male:	Mean Length	537	688		790			
	Std. Error	19	18		50			
	Range	500- 560	670- 705		740- 840			
	Sample Size	3	2	0	2	0	0	0
Female:	Mean Length				815			
	Std. Error				185			
	Range				630- 1000			
	Sample Size	0	0	0	2	0	0	0
Stratum 3:	06/30 - 07/6							
Sampling Dates:	07/01 - 07/06							
Male:	Mean Length	535	666		789			
	Std. Error	7	16		30			
	Range	455- 590	515- 750		700- 865			
	Sample Size	17	16	0	5	0	0	0
Female:	Mean Length	540	678		807		900	
	Std. Error		11		18			
	Range	540- 540	640- 700		690- 900		900- 900	
	Sample Size	1	5	0	13	0	1	0
Stratum 4:	07/07 - 07/13							
Sampling Dates:	07/07 - 07/13							
Male:	Mean Length	541	668		739			
	Std. Error	6	7		16			
	Range	440- 745	490- 800		630- 820			
	Sample Size	83	83	0	13	0	0	0
Female:	Mean Length		689		801		810	
	Std. Error		10		8		30	
	Range		610- 785		710- 875		780- 840	
	Sample Size	0	19	0	21	0	2	0
Stratum 5:	07/14 - 07/20							
Sampling Dates:	07/14 - 07/20							
Male:	Mean Length	544	689		766		860	
	Std. Error	10	7		23			
	Range	420- 620	570- 825		610- 890		860- 860	
	Sample Size	20	58	0	12	0	1	0
Female:	Mean Length		724		835		900	
	Std. Error		24		21		30	
	Range		620- 805		750- 940		870- 930	
	Sample Size	0	7	0	9	0	2	0

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		Brood Year and Age Class						
		1998	1997		1996		1995	1994
		1.2	1.3	2.2	1.4	2.3	1.5	1.6
Stratum 6:	07/21 - 07/27							
Sampling Dates:	07/21 - 07/25 & 07/27							
Male:	Mean Length	547	722		760			
	Std. Error	22	12		10			
	Range	465- 645	675- 825		750- 770			
	Sample Size	8	16	0	2	0	0	0
Female:	Mean Length		780		811			
	Std. Error		10		16			
	Range		770- 790		775- 890			
	Sample Size	0	2	0	7	0	0	0
Stratum 7:	07/28 - 08/03							
Sampling Dates:	07/29 & 07/30							
Male:	Mean Length	585	588					
	Std. Error		8					
	Range	585- 585	580- 595					
	Sample Size	1	2	0	0	0	0	0
Female:	Mean Length				865			
	Std. Error							
	Range				865- 865			
	Sample Size	0	0	0	1	0	0	0
Strata 8 - 13:	08/04 - 08/10							
No Samples Collected								
Strata 1 - 13:	06/16 - 09/14							
Sampling Dates:	06/28 - 07/30							
Male:	Mean Length	541	672		772		860	
	Std. Error	4	5		17			
	Range	420- 745	490- 825		610- 890		860- 860	
	Sample Size	132	177	0	34	0	1	0
Female:	Mean Length	540	694		815		875	
	Std. Error		7		35		21	
	Range	540- 540	610- 805		630-1000		780- 930	
	Sample Size	1	33	0	53	0	5	0

Appendix 19.—Estimated age and sex composition of weekly coho salmon escapements through the East Fork Andreafsky River weir, Alaska, 2002, and estimated design effects of the stratified sampling design.

		Brood Year and Age Group				
		1999	1998	1997		
		1.1	2.1	2.2	3.1	Total
Strata 1 - 11:	06/16 - 08/31					
No Samples Collected						
Stratum 12:	09/01 - 09/07					
Sampling Dates:	09/05 & 09/06					
Male:	Number in Sample:	1	59	0	15	75
	Estimated % of Escapement:	0.8	44.7	0.0	11.4	56.8
	Estimated Escapement:	14	820	0	208	1,042
	Standard Error:	13.4				
Female:	Number in Sample:	0	52	0	5	57
	Estimated % of Escapement:	0.0	39.4	0.0	3.8	43.2
	Estimated Escapement:	0	722	0	69	792
	Standard Error:	0.0				
Total:	Number in Sample:	1	111	0	20	132
	Estimated % of Escapement:	0.8	84.1	0.0	15.2	100.0
	Estimated Escapement:	14	1,542	0	278	1,834
	Standard Error:	13.4	56.5	0.0	55.3	
Stratum 13:	09/08 - 09/14					
Sampling Dates:	09/08 & 09/09					
Male:	Number in Sample:	0	59	0	8	67
	Estimated % of Escapement:	0.0	46.8	0.0	6.3	53.2
	Estimated Escapement:	0	785	0	106	891
	Standard Error:	0.0	71.9	0.0	35.2	
Female:	Number in Sample:	0	47	0	12	59
	Estimated % of Escapement:	0.0	37.3	0.0	9.5	46.8
	Estimated Escapement:	0	625	0	160	785
	Standard Error:	0.0	69.7	0.0	42.3	
Total:	Number in Sample:	0	106	0	20	126
	Estimated % of Escapement:	0.0	84.1	0.0	15.9	100.0
	Estimated Escapement:	0	1,410	0	266	1,676
	Standard Error:	0.0	52.7	0.0	52.7	

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		Brood Year and Age Group				
		1999	1998	1997		
		1.1	2.1	2.2	3.1	Total
Strata 1 - 13:	06/16 - 09/14					
Sampling Dates:	09/05 - 09/09					
Male:	Number in Sample:	1	118	0	23	142
	% Males in Age Group:	0.7	83.0	0.0	16.3	100.0
	Estimated % of Escapement:	0.4	45.7	0.0	9.0	55.1
	Estimated Escapement:	14	1,605	0	315	1,933
	Standard Error:	13.4	105.2	0.0	60.3	
	Estimated Design Effects:	1.021	1.004	0.000	1.002	1.003
Female:	Number in Sample:	0	99	0	17	116
	% Females in Age Group:	0.0	85.5	0.0	14.5	100.0
	Estimated % of Escapement:	0.0	38.4	0.0	6.5	44.9
	Estimated Escapement:	0	1,348	0	229	1,577
	Standard Error:	0.0	102.7	0.0	51.6	
	Estimated Design Effects:	0.000	1.004	0.000	0.982	1.003
Total:	Number in Sample:	1	217	0	40	258
	Estimated % of Escapement:	0.4	84.1	0.0	15.5	100.0
	Estimated Escapement:	14	2,952	0	544	3,510 *
	Standard Error:	13.4	77.2	0.0	76.4	
	Estimated Design Effects:	1.021	1.004	0.000	1.004	

* 24 fish counted through the weir during stratum 1 -11 were not included in this total.

Appendix 20.— Length (mm) at age for coho salmon, East Fork Andreafsky River weir, Alaska, 2002.

		Brood Year and Age Group			
		1999	1998	1997	
		1.1	2.1	2.2	3.1
Stata 1 - 11: No Samples Collected	06/16 - 08/31				
Stratum 12:	09/01 - 09/07				
Sampling Dates:	09/05 & 09/06				
Male:	Mean Length	650	535		547
	Std. Error		6		13
	Range	650- 650	425- 625		450- 620
	Sample Size	1	59	0	15
Female:	Mean Length		551		558
	Std. Error		5		12
	Range		435- 615		525- 590
	Sample Size	0	52	0	5
Stratum 13:	09/08 - 09/14				
Sampling Dates:	09/08 & 09/09				
Male:	Mean Length		531		526
	Std. Error		6		9
	Range		445- 650		490- 550
	Sample Size	0	59	0	8
Female:	Mean Length		545		556
	Std. Error		5		10
	Range		445- 625		455- 600
	Sample Size	0	47	0	12
Strata 1 - 13:	06/16 - 09/14				
Sampling Dates:	09/05 - 09/09				
Male:	Mean Length	650	533		540
	Std. Error		4		9
	Range	650- 650	425- 650		450- 620
	Sample Size	1	118	0	23
Female:	Mean Length		548		557
	Std. Error		3		8
	Range		435- 625		455- 600
	Sample Size	0	99	0	17

Appendix 21.—Chum, chinook, and coho salmon escapement counts for the Andreafsky River, Alaska, 1961-2002.

	East Fork Andreafsky River						Main Stem Andreafsky River		
	Aerial Index Estimates			Sonar, Tower, or Weir			Aerial Index Estimates		
Year	Chinook Salmon	Chum Salmon	Coho Salmon	Chinook Salmon	Chum Salmon	Coho Salmon	Chinook Salmon	Chum Salmon	Coho Salmon
1961	1,003								
1962	675 [a]						762 [a]		
1963									
1964	867						705		
1965							344 [a]		
1966	361						303		
1967							276 [a]		
1968	380						383		
1969	274 [a]						231 [a]		
1970	665						574 [a]		
1971	1,904						1,682		
1972	798						582 [a]		
1973	825	10,149 [a]					788	51,835	
1974		3,215 [a]					285	33,578	
1975	993	223,485					301	235,954	
1976	818	105,347					643	118,420	
1977	2,008	112,722					1,499	63,120	
1978	2,487	127,050					1,062	57,321	
1979	1,180	66,471					1,134	43,391	
1980	958 [a]	36,823 [a]					1,500	114,759	
1981	2,146 [a]	81,555	1,657 [a]		147,312 [b]		231 [a]		
1982	1,274	7,501 [a]			181,352 [b]		851	7,267 [a]	
1983					110,608 [b]				
1984	1,573 [a]	95,200 [a]			70,125 [b]		1,993	238,565	
1985	1,617	66,146					2,248	52,750	
1986	1,954	83,931		1,530 [c]	167,614 [c]		3,158	99,373	
1987	1,608	6,687 [a]		2,011 [c]	45,221 [c]		3,281	35,535	
1988	1,020	43,056	1,913	1,339 [c]	68,937 [c]		1,448	45,432	830
1989	1,399	21,460 [a]					1,089		
1990	2,503	11,519 [a]					1,545	20,426 [a]	
1991	1,938	31,886					2,544	46,657	
1992	1,030 [a]	11,308 [a]					2,002 [a]	37,808 [a]	
1993	5,855	10,935 [a]					2,765	9,111 [a]	
1994	300 [a]			7,801 [d]	200,981 [ad]		213 [a]		
1995	1,635			5,841 [d]	172,148 [d]	10,901 [d]	1,108		
1996				2,955 [d]	108,450 [d]	8,037 [d]	624		
1997	1,140			3,186 [d]	51,139 [d]	9,472 [d]	1,510		
1998				4,011 [d]	67,591 [d]	5,417 [ad]			
1999				3,347 [d]	32,229 [d]	2,963 [d]			
2000	1,018 [e]			1,344 [d]	22,918 [d]	8,225 [d]	427		
2001	1,065 [e]			1,148 [ad]	2,086 [ad]	*9,252* [d]	570		
2002	1,447 [e]			4,123 [d]	44,194 [d]	*3,534* [ad]	977		
I.O.	>1,500	>109,000					>1,400	>116,000	

I.O. Interim aerial index objective

[a] *Incomplete survey and/or poor survey timing or conditions resulting in minimal or inaccurate count*

[b] *Sonar count*

[c] *Tower count*

[d] *Weir count*

[e] *Personal Communication with Tracy Lingnau*